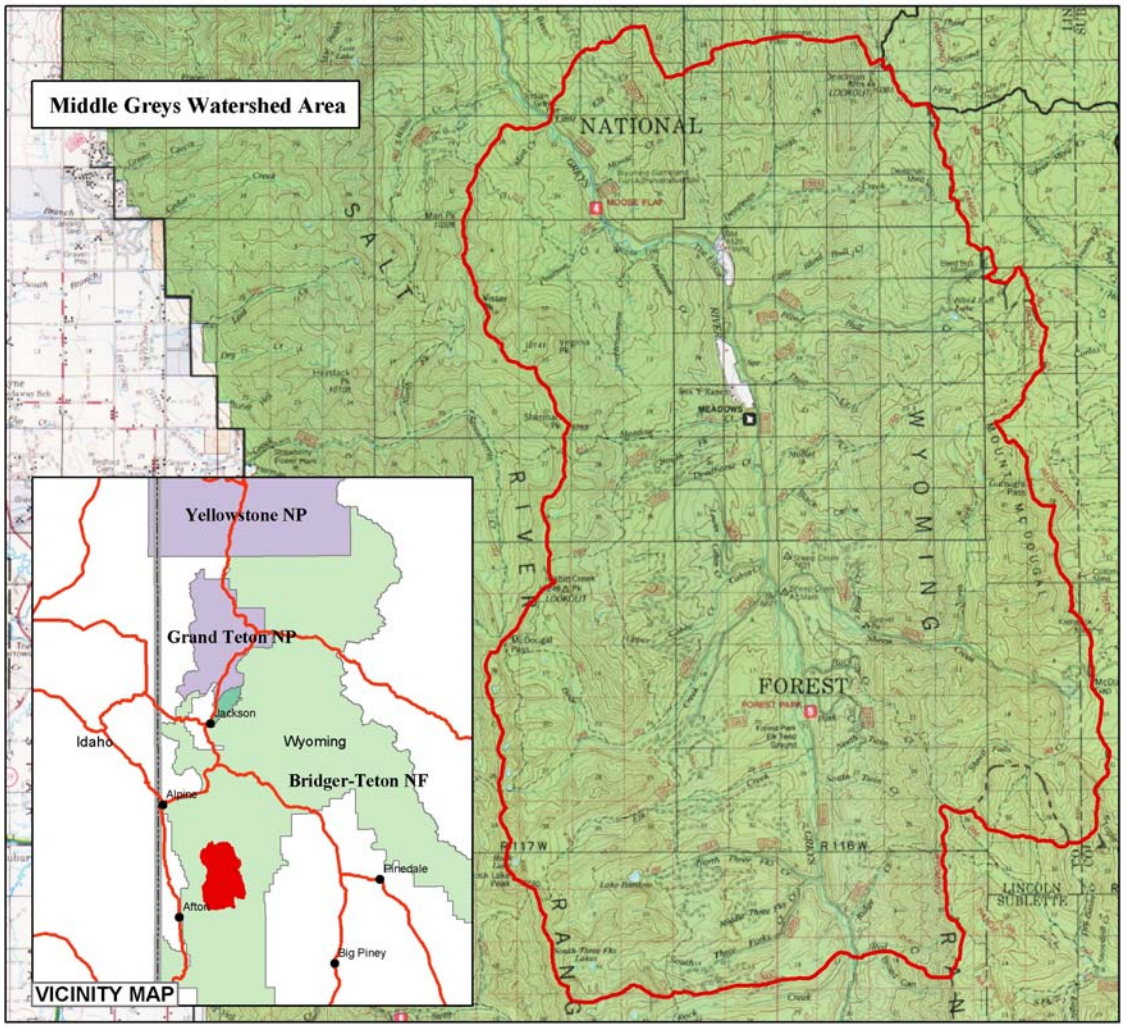
Middle Greys River Watershed Assessment

Greys River Ranger District

Bridger-Teton National Forest

Lincoln County, Wyoming

May 2005



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Section

1 Introduction

This report provides summary characterization of the human, terrestrial, and aquatic features, conditions, processes, and interactions within the national forest portion of the Middle Greys River watershed (5th Level Hydrologic Unit Code 1704010305). This characterization was developed by an interdisciplinary team, under guidance by the District Ranger, using the *Federal Guide for Watershed Analysis – Ecosystem Analysis at the Watershed Scale* (Version 2. 2, August 1995) as a guideline. Table 1 provides perspective for the scale of the assessment presented in this report in relation to watershed hierarchy classification (Maxwell et al. 1995).

Table 1. Watershed classification hierarchy

Level	Description	Hydrologic Unit Name and Code
1st	Region	Pacific NW (17)
2nd	Sub-region	Upper Snake (1704)
3rd	River Basin	Snake Headwaters (170401)
4th	Sub-basin	Greys-Hoback (17040103)
5th	Watershed	Greys River (1704010305)
6th	Sub-watershed	Deadman Creek (170401030506)
6th	Sub-watershed	BlindBull Creek (170401030505)
6th	Sub-watershed	Sheep Creek (170401030504)
6th	Sub-watershed	Bear Creek (170401030503)

The assessment area is the national forest portion of the Middle Greys River hydrologic unit, which is shown on the cover. This area is administered by staff of the Bridger-Teton National Forest, which is located in the Greys River Ranger District office in Afton, Wyoming and the Supervisor's Office in Jackson, Wyoming. Table 1.2 presents pertinent ownership and acreage information.

This watershed assessment is a broad-scale picture of four sub-basins set within the context of the larger watershed. An Interdisciplinary Team (IDT) of resource specialists have compared erosion processes, hydrology, vegetation, stream channel, water quality, species and habitats, and human uses to center the document around three core topics: grazing, roads/access, and vegetation condition/ wildlife habitat (sections 2 and 3). IDT analysis of the core topics is the basis for recommendations (section 4) to reduce conflict between land use allocations and improve resource management.

The purpose of this assessment is to refine projects and priorities from the Greys River Landscape Scale Assessment (GRLSA 2004) that encompass the watershed (5th code

HUC). It is also going to be used as a means for refining desired future condition (DFC) at the sub-watershed (6^{th} code HUC) level.

Table 1.2 Land ownership

Area	Acreage
Total hydrologic unit code acres	109136
Acres national forest system lands	108746
Acres of private land within national forest administrative boundary	390

This watershed assessment is not a decision document. Rather, it provides information to set the stage for subsequent decision making processes, including planning, project development, and regulatory compliance. Recommendations within this report provide a means of refining the desired condition of the Middle Greys River watershed as the Forest continues implementation of its Land and Resource Management Plan. Prior to implementing any recommendation or project, they must go through the process outlined in the National Environmental Policy Act (NEPA). Although non-Forest Service lands are inside the watershed boundary and were considered in the assessment, recommendations will apply only to lands administered by the Forest Service.

Section

2 Issues and Concerns

The interdisciplinary team identified and described ecological processes of greatest concern and established the degree of which the process is functioning (Section 3). Past and present human uses were also taken into consideration in this process. From this information, the team developed a list of issues and concerns that drive recommendations/projects (Section 4). The list is not prioritized and it is not inclusive or conclusive. The following items represent issues and concerns relative to reasonable management of the national forest portion of the watershed.

1. Decline in aspen communities from conifer encroachment and age.

2. Prevalence of older age classes in sage brush and conifer including white bark pine.

3. Potential effect to wildlife winter range and recreation opportunities from potential development of private land at Deadman Ranch and Box Y.

4. Motorized and non-motorized access, either too much or too little, for recreation, vegetation management, wildlife management, and fire protection.

5. Encroachment of motorized vehicles into areas designated as non-motorized.

6. Spread of invasive and noxious weeds along roads and trails.

7. Elevated risk of large wildfires due to large contiguous conifer stands.

8. The high cost of protecting private property, Forest Service and Wyoming Game and Fish Department structures from wildfire (WUI).

9. Horizontal, vertical, and species diversity of upland and riparian plant species, including loss of aspen and tall forb components of vegetation diversity.

10. Localized effects of the transportation system on watershed health from inadequate road and trail maintenance and locating roads and trails in flood plains.

11. Localized loss of riparian habitat due to concentrated dispersed recreation areas and ungulate (wildlife and livestock) grazing.

12. Forest system roads not built to standards adequate to handle the level of use.

13. Potential insect and disease infestation into the analysis area from surrounding areas.

14. Outdated Allotment Management Plans which do not provide adequate direction to improve range conditions.

15. Restoration of past clearcuts through vegetation management to enhance scenic quality.

16. Additional maintenance of Forest System trails and campgrounds to handle increased use.

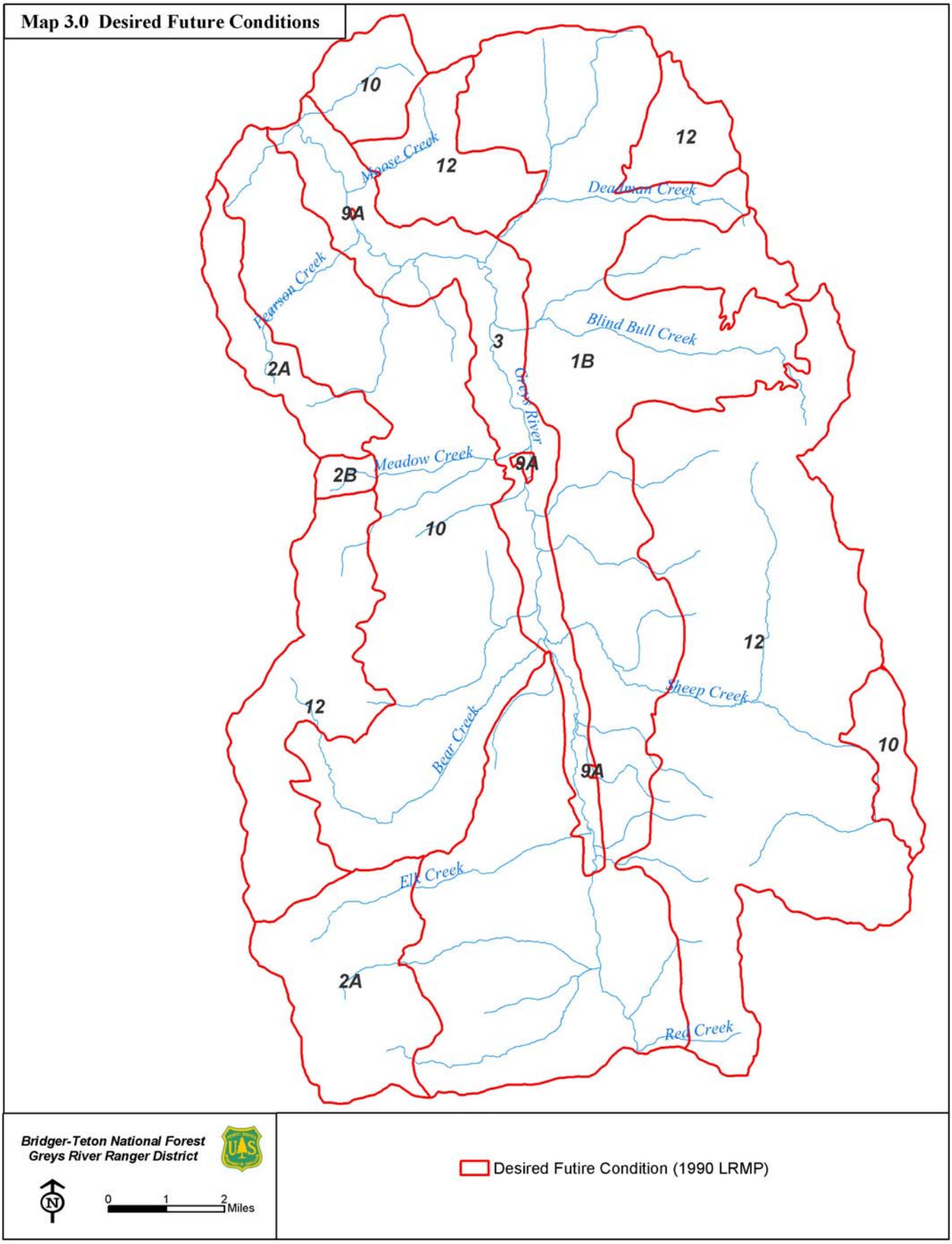
Section

3 Characterization

In this section, current conditions and trends in physical processes, natural resources and human activities in the assessment area are described. This information is used to compare differences that may exist between past and present conditions, allowing the team to formulate relevant issues and concerns (Section 2). A characterization of existing conditions by resource area provides a basis for future project and recommendations (Section 4).

Table 3. Desired Future Condition (DFC)

DFC Areas	Direction Summaries	Acres
1B	An area managed for timber harvest, oil and gas, and other commercial activities with many roads and moderate to occasionally substantial emphasis on other resources.	33,343
2A	An unroaded area managed to give a non-motorized semi-primitive to primitive recreational experience.	8,169
2B	An area managed to give a semi-primitive motorized recreation experience.	425
3	Managed to protect from activities that could diminish or change the free-flowing characteristic , water quality, or the scenic, recreational, fish and wildlife, and other values that make it eligible for addition to the National Wild and Scenic River System.	8,074
9A	An area managed for campgrounds, other noncommercial areas, and Forest Service administrative sites, included related roads and sites.	97
10	Provide long-term and short-term habitat to meet the needs of wildlife, managing this in balance with timber harvest, grazing, and mineral development. Timber harvesting is scheduled in a manner to have either positive effects on wildlife habitat, or at least no detrimental effects. New oil and gas leases would be issued with appropriate stipulations to require compatibility with other resource values.	22,113
12	An area managed for high-quality wildlife habitat and escape cover, big-game hunting opportunities, and dispersed recreation activities.	36,841


Map 3.0 Desired Future Conditions
10
12
Moose Creek
12
Deadman Creek
9A
Pearson Creek
Blind Bull Creek
3
1B
2A
Greys River
Meadow Creek
9A
2B
10
12
12
Sheep Creek
Bear Creek
10
9A
Elk Creek
2A
Red Creek
Bridger-Teton National Forest
Greys River Ranger District
0 1 2 Miles
Desired Futire Condition (1990 LRMP)

3.1 Characterization of recreation settings from roaded to primitive

3.1.1. Roaded Corridors

The following corridors are the primary roaded areas where most visitors gather for dispersed camping and use of developed sites such as campgrounds, and also for river access. Desired condition for these roads is to retain them with a maintenance level suitable for recreation use. Some would benefit from additional improvements such as dust abatement and pulloffs for river access.

Greys River Road and adjacent areas, including established roadside camps, pulloffs and fishing access sites, firewood cutting areas, campgrounds, guard stations, and outfitter camps. From Murphy Creek to Forest Park the desired condition is a durable two lane road with gravel surface suitable for all forms of traffic.

Sheep Creek – McDougal Gap Road. Desired condition is to retain the road in its current condition, for low traffic volume and numerous pulloffs to access trailheads and parking spots for hunting. Main improved road over the Wyoming Range.

Deadman Creek Road. Desired condition is a single lane road with turn-outs, well drained and surfaced to allow all vehicles access to the Middle Ridge and Deadman Mountain trailheads; beyond the Deadman Mountain trail, the need for a road is questionable; it is steep and eroded from drainage down its center and may be more suitable for 4WD-ATV only.

Little Elk - Porcupine Road. Desired condition is to retain the road as it is, managed for use by high clearance vehicles, light to moderate traffic, one lane with frequent pullouts. Continue seasonal closure to protect elk calving areas. A need exists to create more effective physical barriers to off-route travel, since ATV users have been creating routes to the top of Middle Ridge.

Blind Bull Road. Desired condition is to retain the road in its current condition, for low traffic volume and smaller vehicles (dugway is narrow with no opportunity to create more pulloffs). This is one of two roaded access points to the Wyoming Range Trail and the crest of the range.

Bear Creek Road. Desired condition is to retain the road and bridge, with possible spot gravel in deep holes and muddy areas at upper end of the open road.

- **North Three Forks Road.** Desired condition is a low-volume road accessible by pickups and most passenger cars so that 4WD is not necessary to access the Barstow Lake trailhead.

- **Meadows Road.** Desired condition is to maintain the bridge and road as they are for continued access to the west side of the river.

- **Cabin Creek Road.** The desired condition is to retain this road as a high-clearance 4WD route as long as resource conditions and safety are not compromised. The Lower Cabin Creek road is very rough and eroded, suitable for high clearance only, and is lacking in turnouts – in the current condition it is suitable also for ATV use and with the low traffic volume and slow speeds both types of vehicles can use it.

Resource damage along the river from dispersed recreation and vehicle traffic could be kept to a minimum without the need to close opportunities for dispersed camping in desirable locations. Buck and rail fence to temporarily close sites or back people off the river has proven effective; spot gravel and barrier rocks can reduce resource damage on dispersed campsite access roads.

Semi-primitive motorized settings include a mix of primitive jeep-only roads, routes suitable for ATVs and single-track trails. An opportunity for this type of recreational use is limited in the Middle Greys area but we seek to provide quality, sustainable trails where possible. The current travel map is likely to be revised in the next few years; some of the routes now identified as open to motor vehicles are simply not suitable for wheeled vehicles due to steep and rocky terrain, erodable soil types, cliff bands and wet meadow conditions that have already been damaged by vehicle use (Deadman Mountain Trail, the majority of the Way Trail, Upper Bear Creek Trail, Covey Cutoff Trail above the existing timber sale roads, and the Telephone Pass Trail). There is a need to maintain and improve existing routes including the Lake Barstow trail, primitive roads mentioned above (Lower Cabin Creek, upper end of Deadman Creek, and the Porcupine-Little Elk road).

Lake Barstow

Semi-primitive non-motorized and primitive (SPNM-P) backcountry recreation settings

In the Greys River LSA we identified 'high-quality' areas for continued management as backcountry. Factors that contribute to quality of backcountry settings include (1) large size OR a cohesive setting from bottom to head of a watershed, (2) a high level of scenic variety and the presence of special features and attractions, (3) undisturbed character and little to no evidence of human disturbance to the natural setting, (4) opportunities for recreation activities compatible with the primitive setting, (5) access that facilitates recreation uses, including trailheads and a maintained trail system, and (6) a high degree of challenge and opportunity for solitude. The primitive backcountry in the Middle Greys River watershed offers considerably more solitude than many areas in classified wilderness elsewhere on the forest.

The primary SPNM-P areas include the large basin on the east slope of the Salt River Range from Pearson Creek to Anderson Creek, the upper elevations of the Salt River Range between Bear Creek and Upper Three Forks Lakes (excluding Lake Barstow, a popular destination for people using ATVs), the North Fork of Sheep Creek and Mt. McDougal, and the northernmost section of the southern Wyoming Range (McDougal Gap to the headwaters of Sheep Creek).

Winter recreation settings and opportunities
The existing and desired condition is a mix of opportunities for backcountry skiing, snowmobiling, and snowshoeing, with the major access point continuing to be at the Greys River entrance near Alpine. North Horse Creek has become another popular access point; some snowmobilers travel over Blind Bull summit and stop at the Box Y for lunch. Snowmobiling occurs on well-marked and groomed trails (Alpine to Box Y), trails that get occasional grooming, and those that are marked but not groomed. The variety of different levels of challenge is desirable and there are no plans to increase the number of groomed routes. Opportunities for general backcountry off-trail use are numerous although we have tried to discourage use of Sheep Creek and McDougal Gap because of avalanche hazard. Small areas of big game winter range (Forest Park feedground) are closed; we ask snowmobilers to stay on the Greys River Road in that vicinity. Although increasing numbers of backcountry skiers access remote bowl areas via snowmobile, the primary winter use in the Middle Greys is snowmobiling on the main trail system.

Shelter for emergencies is available at Meadows guard station, Box Y and the warming hut at Blind Bull summit. Meadows Guard Station is available for rental to the public and the desired condition is to continue that popular offering while improving the condition of the facility.

3.1.2. Characterization of Recreation Facilities and Services

Developed recreation facilities for day use, group use, visitor orientation and interpretation are provided mostly near the north end of the river corridor along the Greys River Road. Meadows Guard Station is available as a rental to the public when not needed for administrative uses. It needs significant improvement and clean-up – we have it on the R4 Capital Improvement Process (CIP) list and will use opportunities to improve its condition when we can.

Forest Park and Moose Flat Campgrounds were both improved in the late 1990s and offer adequate developed camping in this part of the Greys River. There is some potential for expanding both campgrounds; this has mostly been discussed relative to Moose Flat. The area adjacent to the existing campground has potential as a group site as well. The trailhead area of Pearson Creek, just south of the campground, is a popular camping spot for horsemen fording the river for day rides and hunting in Pearson Creek.

A trail bridge across the river has been discussed in the past, but the cost is prohibitive due to the long span required.

Developing the forested flat south of the Box Y bridge into a campground has been discussed in the past. This is by no means an urgent need since the campgrounds currently don't fill up and people seem to prefer the dispersed, self-contained camping experience.

Centralized facilities for users may be provided in the river corridor; these could include an RV dump station, water system and garbage disposal. We are considering where we might install such facilities and have looked mostly downstream of the Middle Greys (near Murphy Creek).

Suitable sites for reservation by large groups (up to 100) for day use or camping exist in desirable locations – one is near Moose Flat, another between Meadows and Deadhorse Creeks.

Though not quite a developed site, Wray Spring is a popular stop-over for campers along the Greys River road. Continued water testing and protection of the spring, and access to it for visitors, is desirable.

Visitor Information Services
Increased Forest Service presence is the most effective way to convey information to the public. In addition to field patrols by forest employees, state trails program employees, and others, we will rely on recreation permittees and volunteer hosts to give information. The Henderson Creek overlook (photo at left) is an attractive spot but appears to be getting very little use. Perhaps this is because of its location on the bend in the Greys River Road—even with signing it is easy to miss. We may want to consider improving the site or moving the picnic table to a different location. In the Greys River LSA we identified other potential opportunities for visitor information signing, including Blind Bull Lake, which can be seen from above at a turnout on FSR 10123. Beaver dams, ducks, and moose can often be seen there.

Trailheads and other minor recreation facilities
Trailheads are not highly developed in this area, and don't need to be. Most are no larger than necessary to meet the need for trail access; they include a parking area,

directional signing, informational signing if needed, and some have hitchrails or other facilities. Most of the undeveloped trailheads have no need for construction; those which have been identified for development or better facilities are listed in Section 4 of this document.

Cabin Creek Peak lookout may have some potential as a destination; it was improved a few years ago to slow its deterioration. Deadman Mountain lookout is in reasonably good condition. Both are remote and require a long, steep climb to reach.

3.1.3. Characterization of Recreation Uses

Recreation use levels have not been well monitored; summer trail counters on the main Greys River Road or selected trails could help give us a better idea of actual numbers. However, we understand from long observation where the recreation hot spots are. Other than the main Greys River corridor and popular campsites there, Meadow Creek, Lake Barstow, and Telephone Pass are among the more popular trails. The majority of trails receive low use except during hunting season. Trail Creek, Moffat Creek, and Elk Creek trails have pretty much been abandoned, while user-created trails are cropping up in various locations. We have conducted visitor surveys in the past and these give us not only an idea of how many people are coming to the area but what they want when they get here. Some comments from visitors that apply to the Middle Greys are shown below.

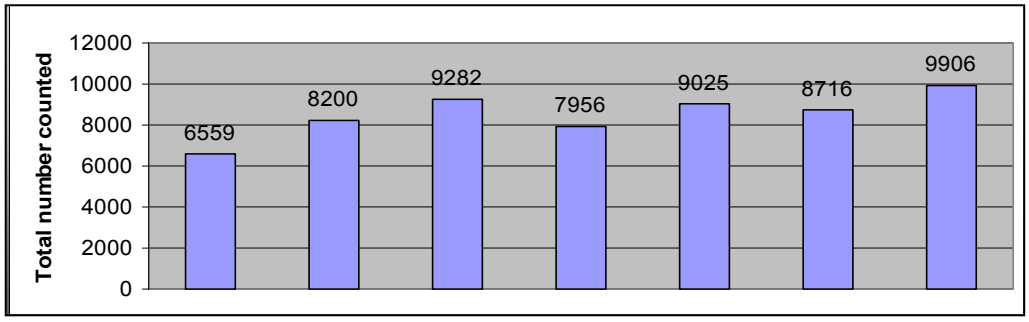
- People frequently cite road conditions as unsatisfactory, most often citing washboards and dust. However, many of those who mentioned the problem also said they didn't want to see the roads improved too much or they would attract too many people. Since we gathered this information we have improved the Greys River road and although the level of use has increased it is hard to attribute this entirely to road improvement.

- RV users have expressed interest in a dump station and we continue to look for a place to install and manage one, probably farther north than the Middle Greys area.

- A desire has been expressed for one or two large group sites. In the Greys River LSA potential sites have been identified, the Moose Flat area being one.

From general observation, trail counters, parking lot counts and visitor contacts it is evident that recreation use is on the increase in all seasons. During the winter, we are seeing a steady increase in snowmobile use at the Alpine and North Horse Creek trailheads. Below is a bar graph showing the trend in total numbers using the Greys River snowmobile trail, 1993-2002. Years of increased visitation correspond to high-snowfall years, with the exception of 1995 (third from left and second-highest use year at 9282 passes recorded on the trail counter). Use was high in 1995 due to the three-week period when Yellowstone National Park was closed for the government 'shut-down' and

outfitters were allowed to use the Greys River trail instead. Some peak afternoons saw 200 people at the Box Y.



Use trends on the Greys River snowmobile trail, 1993 – 2002.

In summer and fall, the Greys River has been "discovered," especially by regional visitors who come year after year to fish, hunt for big game, and participate in family camping. Fall hunting use has fluctuated over the past decade in response to licenses issued by Wyoming Game and Fish Department.

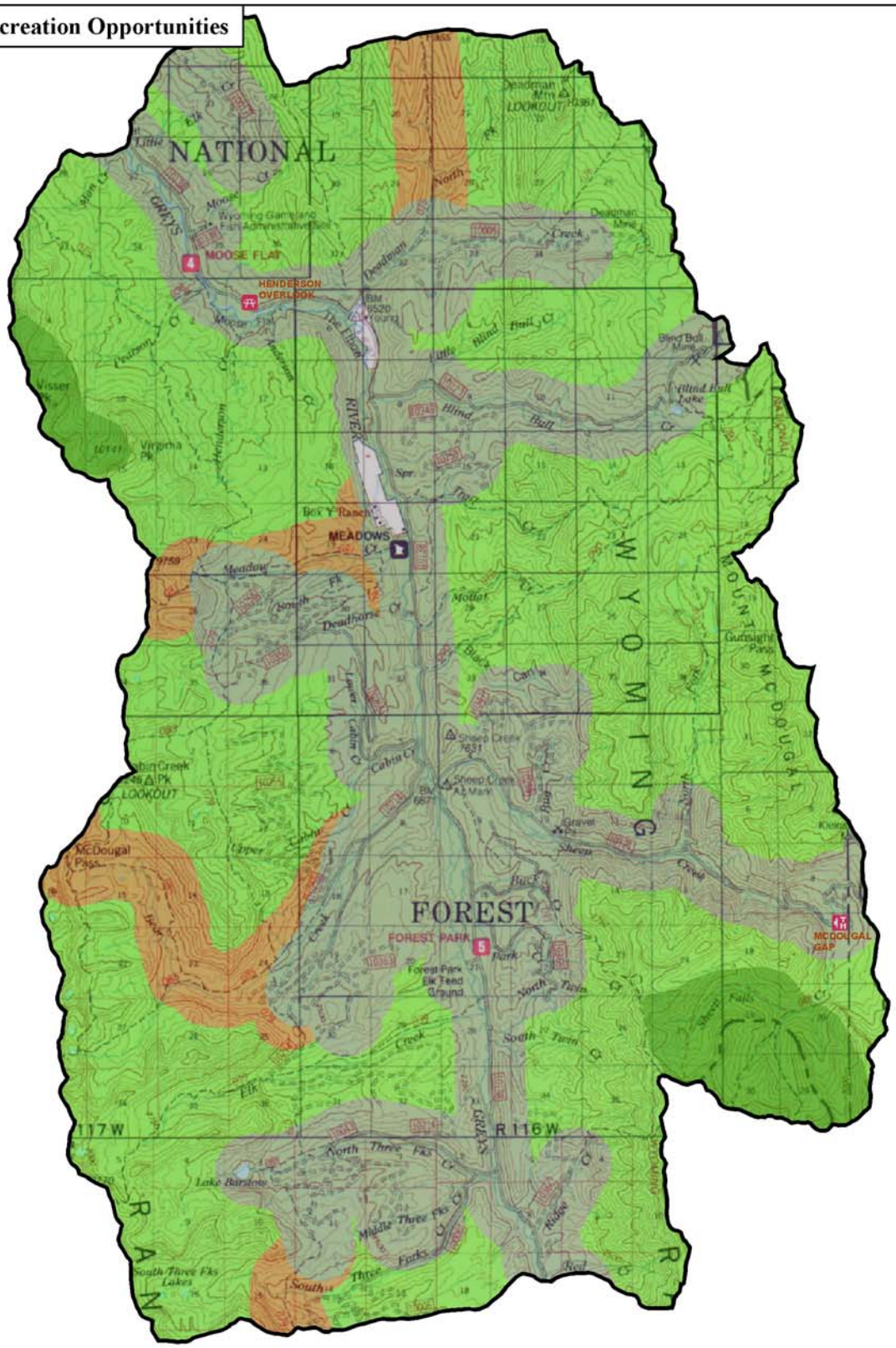
Four outfitter-guides have base camp sites in the Middle Greys (one is on private land). Most offer fall hunting use; one operates in the summer as well. A number of snowmobile guides operate in winter, at least as far as the Box Y. The Greys River LSA included an analysis of public need for additional outfitter-guide service and determined there is no particular need for more.

Desired Future Condition

Much of the Middle Greys area remains in a condition similar to the 'desired' recreation setting and activities listed in the Greys River LSA. An issue might be the potential for changes to existing recreation patterns and settings due to management actions in support of other resources.

The 1990 Forest Plan DFC boundaries did not consider the location of established trails and recreation use patterns. The Greys River LSA documented potential conflicts between high-quality backcountry areas and the land allocations that called for a substantial change in the setting, especially where existing primitive and semi-primitive areas have been mapped as DFC 1B.

Map 3.1 Existing Recreation Opportunities



Bridger-Teton National Forest
Greys River Ranger District

0 1 2 Miles

Existing ROS Setting

- Roaded Natural
- Semi-primitve Motorized
- Semi-primitive Non-motorized
- Primitive

3.2 Vegetation Management

3.2.1 Fire Use and Settings

The role fire plays in wild land ecosystems is well documented and generally accepted by land managers.

- Fire exclusion over the last century or more has resulted in changes in vegetation, including shifts in structure and composition, and increased fuel loads (e.g., conifer encroachment in aspen).

- Domestic livestock grazing and browsing by ungulates has contributed to the loss of fire on the landscape by removing fine fuels that allow the spread of surface fires.

- The impacts of grazing and fire exclusion (primarily fire suppression) have led to shifts in fire regimes in fire adapted vegetation types.

- Heavy dead and down fuel accumulations have and will contribute to large, more intense wildland fires than experienced historically.

Forest cover types included in the Middle Greys assessment area include Englemann spruce/subalpine fir, lodgepole pine, aspen, and Douglas fir. Fire has been the dominant natural disturbance affecting structure, composition, and pattern of forest vegetation. However, active fire suppression over the last 100 years has been very successful at removing fire as an important disturbance mechanism. Fire suppression, timber harvest, and grazing, all efforts of active land management have had an influence on reshaping the vegetation in the analysis area by removing or limiting fire as a landscaping tool.

The extent to which the components of the landscape have been altered or changed by fire exclusion has been categorized in terms of fire regime condition classes (FRCC).

There are three FRCC classes that rate the amount of departure from the central tendency of the natural (historic) regime. Low departure, represented by condition class 1, means that vegetation and associated fire regime is within the natural range. Condition class 2 and 3 are outside the natural regime. Uncharacteristic conditions are those that did not occur within the natural regime such as invasive species, "high graded" forest composition and structure, etc. Amount of departure is based on a comparison of fire regime attributes such as vegetation-fuel composition, fire frequency and fire severity to the central tendency of the natural fire regime (FRCC class version 1.0.5 2004).

A fire regime condition class assessment was conducted for Middle Greys Watershed. The vegetation types were segregated into distinctive potential natural vegetation groups (PNVG). Potential natural vegetation in this context is a biophysical land classification using vegetation as an indicator of climate, soils and historical disturbance. The PNVG is

usually named using the dominant vegetation occurring in the watershed. Table 3.2 describes the PNVGs for this watershed and the FRCC rating.

Table 3.2 Potential Natural Vegetation Groups

PNVG	FRCC Rating	Percent of Watershed
Aspn2 – Aspen w/Conifers	3	16
SPFI5 – Supalpine fir	1	64
WBPI - whitebark	3	1
DFIR1 – dry Doug-fir	3	2
CSAG1b – subalpine big sage	3	6
CSAG1 – Mtn. big sage	3	3
RIPA – Riparian areas	1	1
FORB – Tall Forb Communities	2	1
HERB – Short Forb Communities	3	8

Direction from the recent Healthy Forest Restoration Act emphasizes maintenance of forested stands in all condition classes. To do that we must examine the four forest types to determine those components of the landscape which comprise the cover type and measure to what extent they have been altered or changed due to grazing, fire exclusion, or past management practices. Measurable components that have proven to be good indicators and are easily collected on the Bridger-Teton include stand age, dead and down fuel loads, forest health and stand vigor, and conifer/sagebrush encroachment into aspen stands. Looking at all the measurable components, analyzing forest measurements, and prioritizing areas for vegetation treatment will allow us to make sound management decisions and meet the intent of the Forest Plan and the Healthy Forest Restoration Act.

Approximately 94 fires have occurred in the assessment area since the1950's. Over 10,000 acres have burned in the assessment area since record keeping began in the 1950's (Map 3.2.1). The effects of topography, weather patterns, receptive fuels, severe lightning events, and fall hunting season recreational use combine to produce fire ignitions in the assessment area. Initial attack response to the Middle Greys area by engines can take up to 90 minutes. Initial attack by helitack or smoke jumpers will vary from 20 to 60 minutes depending on the specific location of the ignition. Ignitions in remote, inaccessible areas through out the assessment area tend to be extended attack and lead to high cost per acre to suppress. Wildland Urban Interface (WUI) areas in the assessment area are a special concern to land managers and add to the complexity of fire suppression. These areas include Box Y and Deadman Ranch. Ignitions in close proximity the private property will receive priority over other ignitions and can aid in prioritizing limited firefighting resources.

The Forest Plan was amended in 2004 to allow for natural fire management in the assessment area. The B-T Fire Management Plan will be updated to include use of natural fire across the forest. The plan will identify areas where management ignitions and natural ignitions ("fire use") can be successfully managed for resource benefits.

In order to move the fire adapted ecosystem in the assessment area within the historic range of variability, areas need to be identified where management ignitions and natural ignitions ("fire use") can be successfully managed for resource benefits. Resources that may benefit from fire adapted ecosystem management include aspen, whitebark pine, and wildlife habitat improvement.

Desired Future Condition

The impacts of grazing and fire exclusion (primarily fire suppression) have led to shifts in fire regimes in fire adapted vegetation types away from desired future condition. In order to achieve DFC, aspen representation across the assessment area should be increased. This can be done through disturbance including use of prescribed fire, mechanical treatments or fire use.

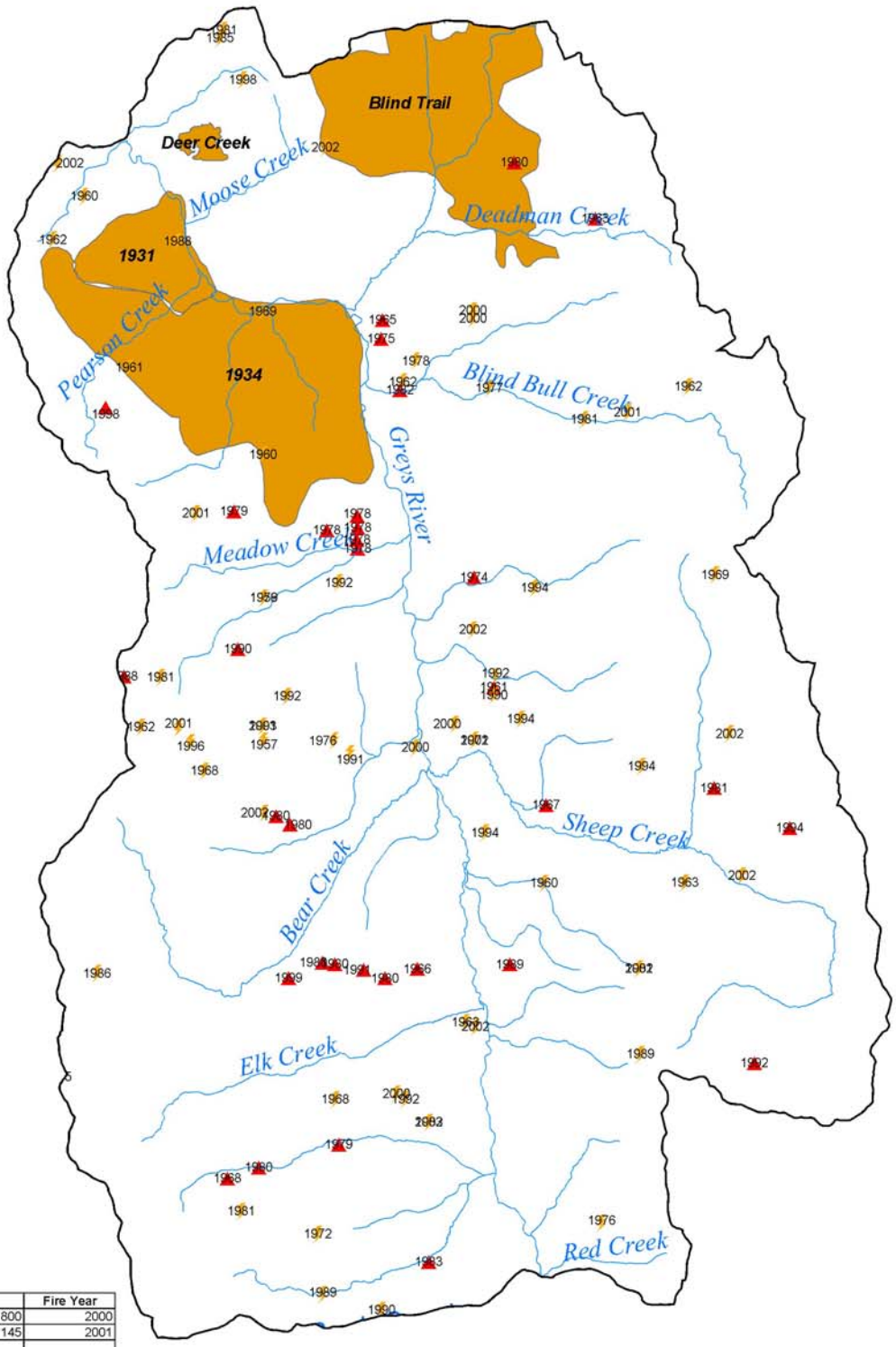
Aspen treatments would increase patch size, young age classes and reduce mature age classes. Disturbance in aspen cover types would increase this species resilience overtime, as well as insure its persistence on the landscape.

Subalpine fir is currently at DFC and should be managed to maintain current representation of age classes and seral species within the vegetation group.

Whitebark pine mortality relative to whitepine blister rust and mountain pine beetle infestation rates need to be monitored. Where possible, disturbances using mechanical treatments, prescribed burns or fire use would increase representation of young age classes, reduce intra-species competition with lodgepole pine and subalpine fir and decrease mature age classes. Land managers should be cautioned against using fire while mountain pine beetle infestations are occurring in the area as fire has a tendency to increase susceptibility to mountain pine beetle attacks.

Natural fire regimes need to be brought back into dry Douglas-fir types. Mechanical treatments, prescribed fire or fire use could be used to increase young age classes and reduce mature age classes through the vegetation group.

Map 3.2.1 Fire History



Fire Name	Reported Acres	Fire Year
Blind Trail	9,800	2000
Deer Creek	145	2001
Fire Name - Pre 1950	**GIS Acres**	**Fire Year**
1931	1,200	1931
1934	5,400	1934

Bridger-Teton National Forest
Greys River Ranger District

0 0.9 1.8 Miles

Legend

- Human Caused Fire
- Large Fires
- Lightning Caused Fire

3.2.2. Range Management

The area of the Middle Greys Watershed Assessment includes all, or portions of 13 grazing allotments. The location of these allotments is shown in Map 3.2.2a. Each of the allotments except White Creek S&G are actively grazed by livestock. A small area, approximately 780 acres, at the south end of the Big Greys C&H Allotment is not included in a grazing allotment.

Currently 14,080 head of sheep and 603 head of cattle are permitted on the allotments that are within the analysis area. The permitted season of use varies for each sheep allotment but is approximately July 6th through September 25th. Cattle are permitted on the Big Greys C&H Allotment from June 16th through October 7th (see Table 3.2.2.).

Table 3.2.2. Grazing Allotments and Permitted numbers.

ALLOTMENT	TYPE	NUMBER	SEASON	GRAZING SYSTEM
*Bear Creek	Sheep	1300	7/6 – 9/20	2-year rest-rotation
*Big Greys	Cattle	610	6/16 – 9/30	Deferred-rotation
Black Canyon	Sheep	1315	7/5 – 9/26	7-year rest-rotation
Blind Bull	Sheep	1320	7/5 – 9/26	7-year rest-rotation
*Blind Trail	Sheep	1300	7/5 – 9/26	7-year rest-rotation
Cabin Creek	Sheep	1315	7/5 – 9/26	7-year rest-rotation
Deadman	Sheep	1315	7/5 – 9/26	7-year rest-rotation
*Grizzly Basin	Sheep	1435	7/5 – 9/26	7-year rest-rotation
*Marten Creek	Sheep	1200	7/6 – 9/15	3-year rest-rotation
South Fork Sheep Creek	Sheep	1200	7/6 – 9/15	3-year Rest-rotation
*Three Forks	Sheep	1200	7/6 – 9/15	3-year rest-rotation
*Virginia Peak	Sheep	1300	7/6 – 9/20	2-year rest-rotation
*White Creek	Sheep	Vacant	n/a	n/a

*Portions of these allotments are outside the analysis area.

Allotment Status and General Range Conditions

Big Greys C&H Allotment

The Big Greys Cattle Allotment has been grazed under a modified 3-pasture deferred rotation system since the early 1960's (season-long before that time). Efforts to manage the allotment under a true deferred system have been unsuccessful because there are no effective barriers to hold cattle. Fences were constructed along the east and west boundaries of the allotment in the 1960's. It is likely that these fences were effective in controlling cattle when initially constructed. However, heavy snow loads and falling timber quickly damaged these fences. At that time, the Forest Service was responsible for maintaining the fences. According to the current permittees, no maintenance was ever done on these fences and within a few years they were completely ineffective at controlling cattle.

During the past few years a significant amount of unauthorized use has occurred as cattle have strayed into adjacent pastures or onto adjacent sheep allotments. Sheep from these allotments have also regularly been allowed to remain on the Big Greys cattle allotment. In 2004 the Big Greys and adjacent sheep permittees agreed to make a concerted effort to improve herding with improved results.

Over the past four years forage utilization has been measured at or near Forest Plan Standards. During this time overall utilization has decreased as livestock distribution has improved. Localized areas of overgrazing still occur but the number and size of these areas appear to be decreasing. While impacts from over utilization of forage are decreasing, vegetative diversity, species composition, and forage production are still considered to be below desirable levels. Improvement is these areas should follow as grazing pressure is better distributed throughout the allotment.

Sheep Allotments

Black Canyon, Blind Bull, Deadman, Blind Trail, Grizzly Basin, Cabin Creek and Stewart Creek (this allotment is outside the analysis area) allotments are grazed by 6 bands of sheep. Each allotment is rested every seventh year. Range analysis data and the Allotment Management Plan approved in 1986 indicate that the capacity of these allotments may be less than is currently permitted. The AMP suggests that only 5 bands be allowed to graze the allotment complex until the grazing capacity can be determined.

Grizzly Basin S&G Allotment

Recent inspections of the Grizzly Basin S&G Allotment have shown that the allotment is relatively well managed. While there are problems with livestock management in the northern portion of the allotment, the portion of the allotment that is within the middle Greys sub watershed is used relatively lightly and no impacts from current livestock grazing have been observed. There is some conflict with sheep use on the neighboring cattle allotment where sheep are unloaded at Moose Flat, Dead Dog Creek, Blind Bull Flat and Trail Creek. In recent years, sheep have been unloaded on the Greys River Road and were allowed to stay on the cattle allotment much longer than was necessary. In 2004, sheep unloaded at the above locations were moved to the Grizzly Basin Allotment within a few hours of unloading.

The south-western edge of the Grizzly Basin Allotment has been designated as big game winter range. Although there have been a few exceptions, the permittee has made only incidental use of this area. Inspections of this area have shown that utilization of forage within the winter range area is very limited. No other impacts from livestock have been observed in the designated winter range.

Blind Trail S&G Allotment

Approximately one quarter of the Blind Trail Allotment lies within the analysis area. Areas of this allotment that have been inspected show that it is generally well managed. However isolated areas in the draws to the north and south of Telephone Pass have had excessive use around the Telephone Pass water development and bedding/salt grounds.

The Blind Trail fire of 2002 burned several thousand acres of this allotment. The removal of timber has allowed a significant increase in the amount of forage for both livestock and wildlife. This will reduce grazing pressure across other areas of the allotment resulting in increased vegetative cover and vigor in other areas.

Deadman, Blind Bull & Black Canyon S&G Allotments

The Deadman, Blind Bull and Black Canyon allotments are all similar in resource condition, opportunities and limitations. A large portion of these allotments is of limited use to livestock due to steep slopes and heavily timbered areas that produce little palatable sheep forage. Information contained in allotment records and on-the-ground inspections shows that historic livestock use has either been excessive, or insignificant, with few if any areas of moderate use. The lower elevation areas typically contain more timber than the higher areas which are much flatter and contain more palatable forage. The latter areas have been heavily impacted. Portions of old stock driveways pass through areas of these allotments. The area of the driveways themselves and surrounding areas were heavily overgrazed. These areas were dominated by tall forb vegetative communities which have a relatively low tolerance for defoliation. Pressure from grazing and trampling reduced vegetative cover and led to significant soil loss.

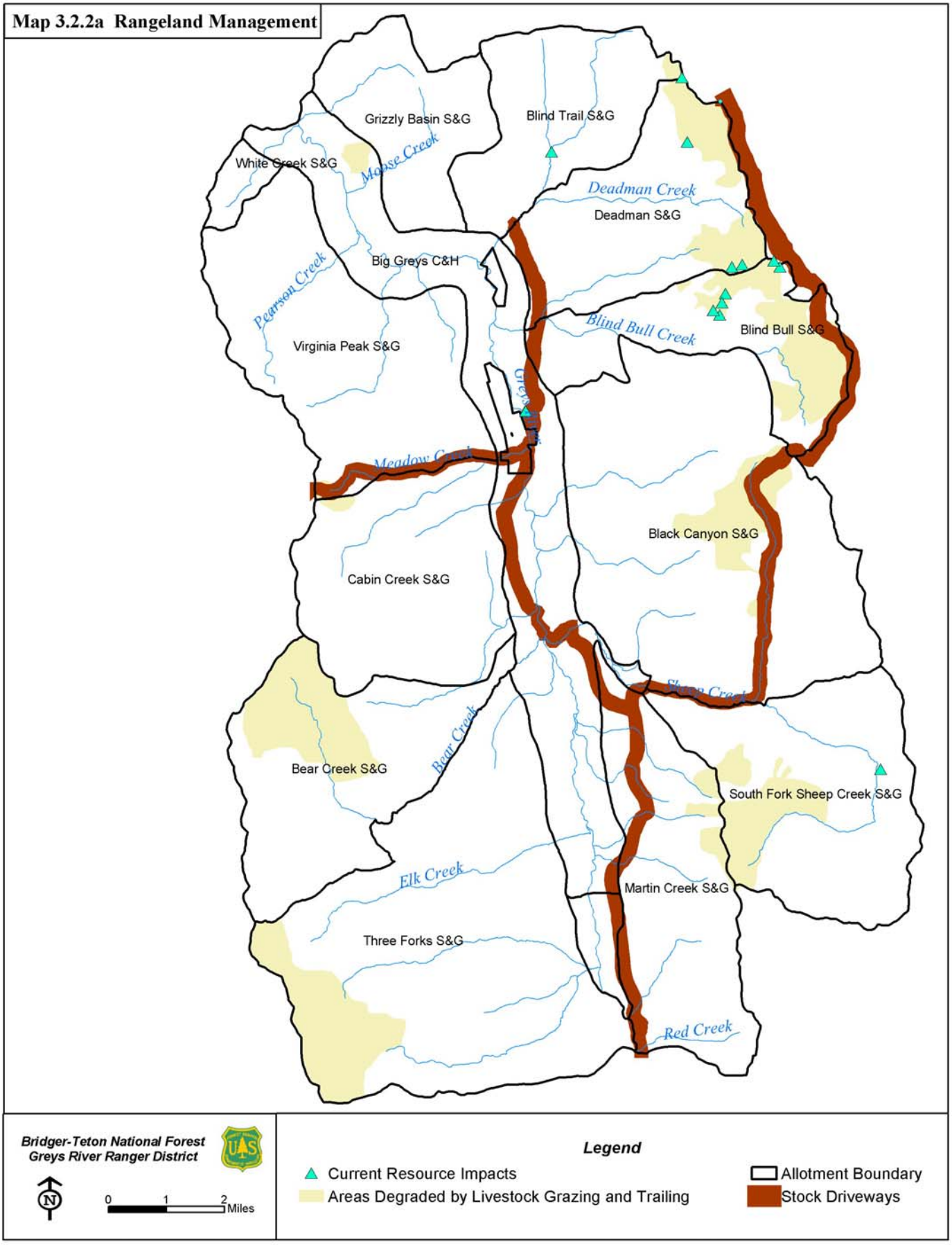
Most of the tall forb communities that existed in the higher elevations of these allotments have been depleted of protective vegetative cover. Monitoring shows that most of these areas are recovering although very slowly. A significant amount of soil loss has occurred and these areas probably never will return to pristine condition. Desired plant species i.e., Sticky geranium *(Geranium viscossimumi*), Fernleaf ligusticum (*Ligusticum filicum*), Tobacco root (*Valeriana edulis*), and Mountain brome (*Bromus carinatus*) although present, are a minor component of the existing vegetation. However, if grazing pressure is limited, perennial vegetative cover will likely return.

Martin Creek and South Fork of Sheep Creek S&G Allotments

Marten Creek and South Fork Sheep Creek sheep allotments are managed as part of a complex with 3 allotments on the east side of the Wyoming Range. Very little data is available on these allotments. Inspections in 1999 and 2001 indicated that the higher elevation range areas are being heavily impacted by sheep grazing. According to the allotment management plan each allotment is scheduled to be rested every third year. However, since 2000, the permittee has voluntarily taken non-use for resource protection. The Marten and Sheep Creek allotments have been grazed every other year with one band of sheep. From discussions with the permittee, this limited grazing pressure is likely to continue into the near future.

Three Forks S&G Allotment

The Three Forks allotment is permitted for 1200 sheep. This allotment is grazed on a five-year rest rotation. Portions of this allotment were heavily impacted by sheep grazing in the early and mid-1900s. Inspections since 1999 indicate that vegetative cover is increasing over most of the allotment. Current management appears to be sustainable.


Map 3.2.2a Rangeland Management
Grizzly Basin S&G
Blind Trail S&G
White Creek S&G
Moose Creek
Deadman Creek
Deadman S&G
Big Greys C&H
Pearson Creek
Blind Bull Creek
Blind Bull S&G
Virginia Peak S&G
Meadow Creek
Black Canyon S&G
Cabin Creek S&G
Bear Creek
Bear Creek S&G
South Fork Sheep Creek S&G
Elk Creek
Martin Creek S&G
Three Forks S&G
Red Creek
Bridger-Teton National Forest
Greys River Ranger District
N
0 1 2 Miles
Legend
Current Resource Impacts
Areas Degraded by Livestock Grazing and Trailing
Allotment Boundary
Stock Driveways

Bear Creek & Virginia Peak S&G Allotments

Bear Creek and Virginia Peak sheep allotments are each grazed in combination with two other allotments that are not in the Greys River Drainage. Three bands of sheep are grazed on three of the four allotments, with one allotment being rested each year. The current permittee has never run their full numbers and is very conservative in their stocking levels. The Bear Creek Allotment is typically stocked with about 1100 sheep (85% of permitted number) and the Virginia peak with 900 to 1000 (75% of permitted number) head of sheep. Prior to 1970 a stock driveway ran along the southern boundary of the Virginia Peak Allotment. The upper reaches of Meadow Creek below Covey Cutoff were impacted by trailing sheep. Soil loss and a lack of adequate protective cover still exist. This area is grazed very lightly and perennial vegetation is increasing.

One minor concern with these allotments is livestock straying into the Henderson, Anderson, and Pearson Creek areas. The cattle and sheep permittees have agreed to assist each other and move livestock that stray across the allotment boundary. So far there have been few disagreements with the way this situation is being handled.

Cabin Creek S&G

The Cabin Creek S&G Allotment is currently used to graze one band of dry ewes. Inspections of this allotment have not identified any resource concerns related to livestock grazing. The only persistent problem being cattle straying onto the allotment along the Cabin Creek road. In 2004 a cattle guard was replaced. The Cabin Creek Drift Fence is scheduled to be reconstructed in 2005. These two improvements will eliminate this problem.

White Creek S&G Allotment

Only a small portion of the White Creek Allotment lies within the Middle Greys Watershed. The White Creek Sheep Allotment has been vacant since the early 1970's when the grazing permit was waived back to the Forest Service. The current allotment is actually a fairly small area that was left over when adjacent allotments were realigned in 1980. It does not contain enough area or suitable range to support a band of sheep. Most of this allotment is very steep, rugged terrain, with many slopes either composed of ledges or heavily timbered. The range which has been classified as suitable for sheep grazing is located in several areas that have been clear cut for timber on the south side of White Creek. An evaluation was initiated in the late 1980's to determine if this allotment should be added to the Big Greys Cattle Allotment. Cattle have been allowed to graze there each year as the adjacent unit is used. Inspections since 1999 have indicated that this area of White Creek can be grazed by cattle if the permittees are willing to intensively manage the area.

General Vegetative Conditions

In general, herbaceous and woody vegetation conditions have been altered from human intervention. The forb/tall forb communities have been significantly reduced due to grazing pressure from domestic livestock and subsequent soil loss. Some localized

improvements could be made through changes is livestock use and physical intervention such as seeding, mulching, and diversions to slow water flow in drainage channels. More intensive activities such as terracing and large structures to slow erosion have shown little benefit in other locations and would likely be cost prohibitive. The key to any successful reclamation will be to properly manage livestock grazing.

The grass and shrub communities have been altered by heavy grazing pressure and suppression of fire. Most of the upland grass/shrub communities have a dominance of mature sagebrush. Reducing the burn interval in these areas would allow an increase of herbaceous forage production. Numerous locations throughout the analysis area would benefit from properly managed fire.

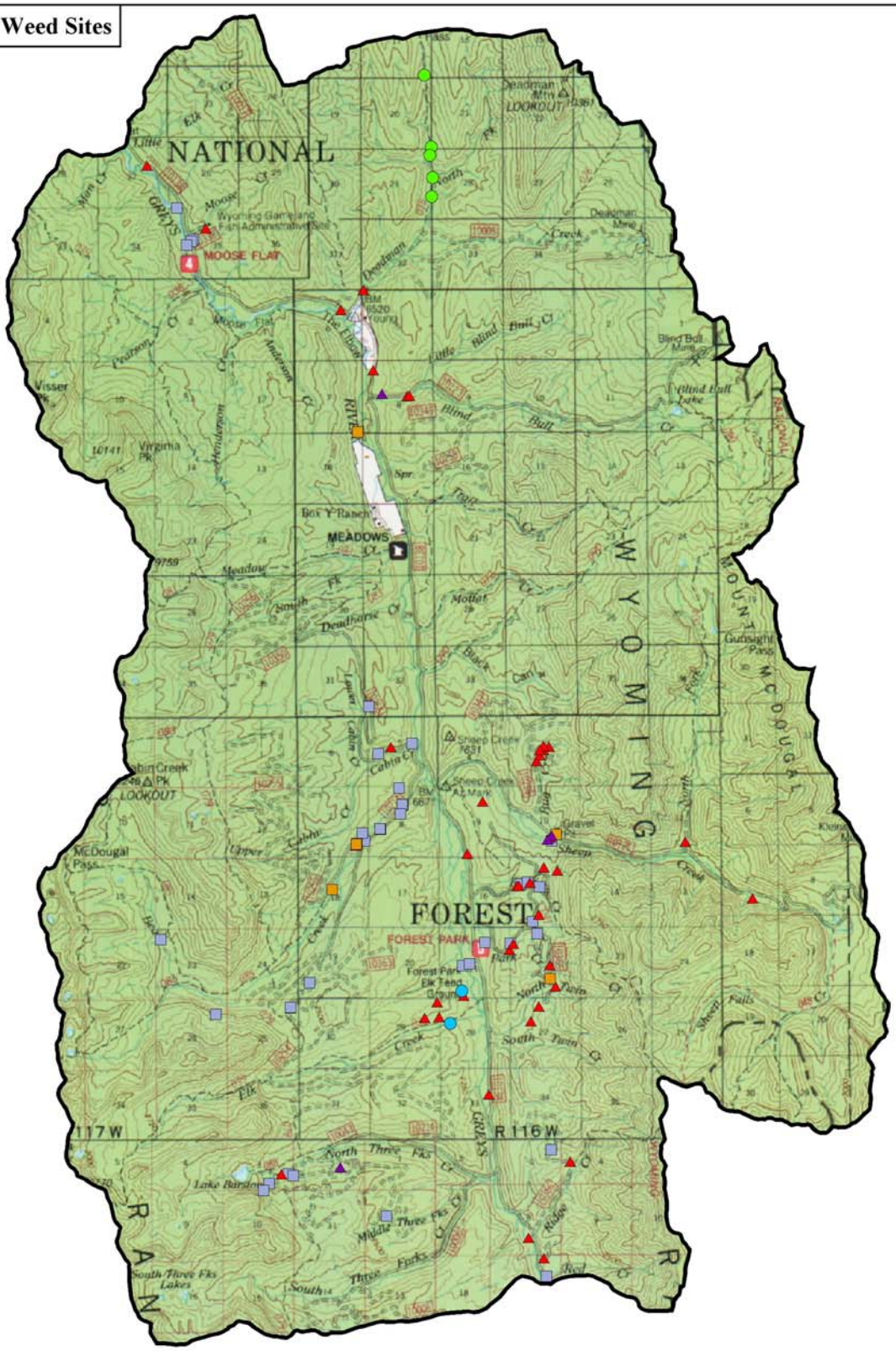
With the exception of the Greys River, most riparian communities in the analysis area have little direct impact from current livestock grazing. The most significant impact in sheep allotments is sedimentation that is generated in adjacent upland areas.

Noxious weeds are present throughout the analysis area. The location of known weed sites is shown on Map 3.2.2b. The majority of infestations are adjacent to the Greys River and other frequently used roadways. Infestations are also increasing along trails, in undeveloped campsites and other areas where disturbance occurs. Chemical, biological and mechanical treatments have been effective in controlling many weed populations.

Desired Future Condition

Sheep grazing and trailing has dramatically influenced vegetation and soils. The greatest impacts occurred along the stock driveways. Since the driveways were closed in the late 1960's, marked improvement in vegetative cover has taken place in some areas. With the exception of the Blind Trail, Blind Bull and Deadman allotments current stocking levels are probably sufficient to maintain and improve vegetative conditions if properly managed. There are isolated areas where livestock use is excessive and management needs to be improved.

Map 3.2.2b Noxious Weed Sites



Bridger-Teton National Forest
Greys River Ranger District

N

0 1 2 Miles

Legend

- Leafy Spurge
- Canada Thistle
- Dyers Woad
- Musk Thistle
- Knapweed
- Toadflax

3.2.3. FORESTED VEGETATION

General

The Middle Greys Watershed Assessment Area contains an array of vegetation types and seral stages. Before Euro-American expansion into the area, the dominant processes shaping vegetative patterns on the landscape were disturbances from insects, disease, fire, and grazing. Insects and disease are normally found in all forest types at endemic levels, but periodically reached epidemic outbreak conditions. Large-scale fires would generally follow these epidemics, particularly when coupled with drought conditions. Fire was probably the greatest driving force in the vegetative composition and structure of the forest, as fires set back areas of vegetation to earlier seral stages.

Existing Condition

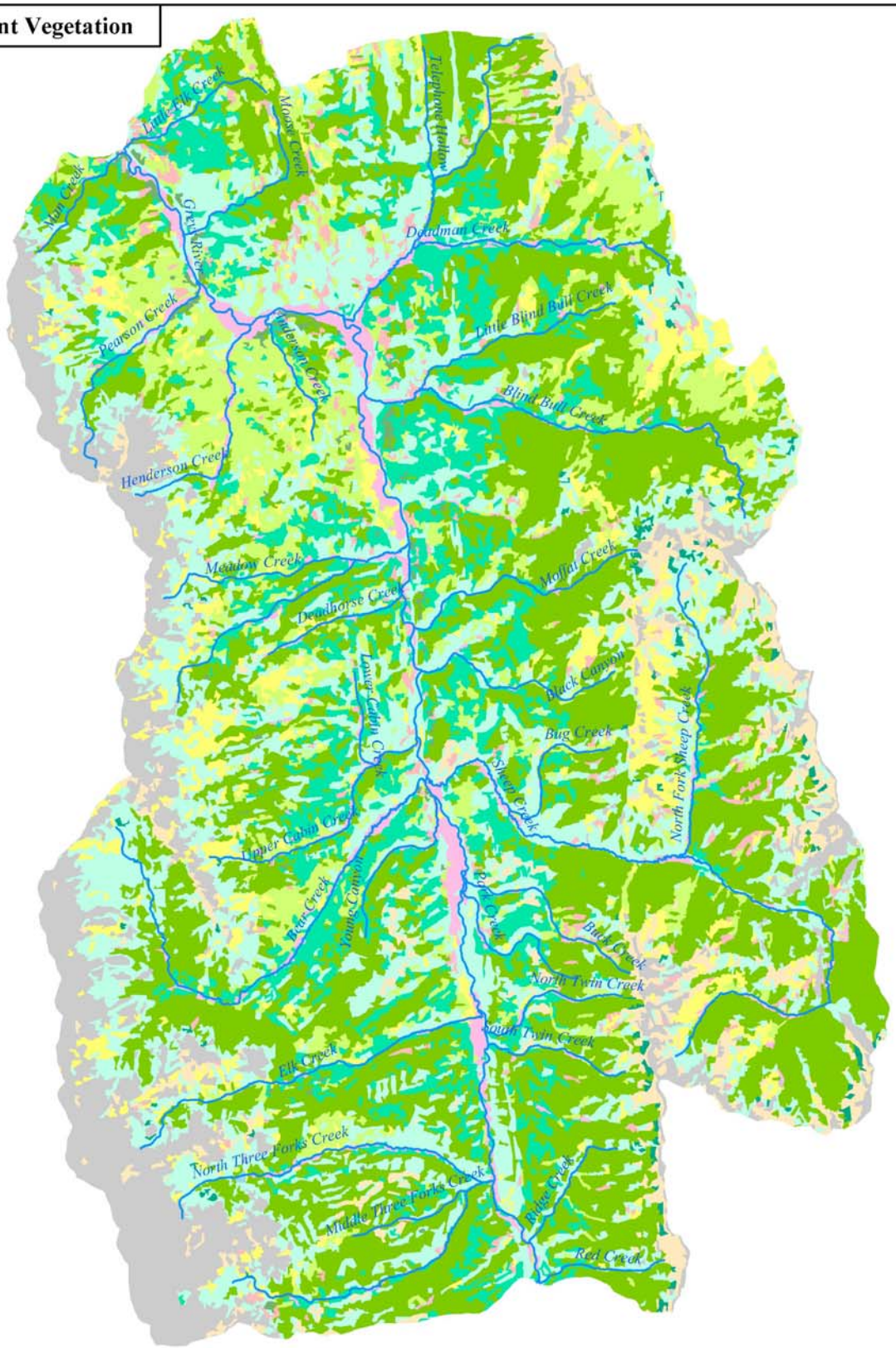
The watershed analysis area is 109,135 acres in size, of which 64,531 acres (59%) is forested. Table 3.2.3a depicts the vegetation classes in the assessment area.

Vegetation information and maps for the project area are derived from the Greys River Landscape Scale Assessment (2004) and remote sensing data collected and assembled for the Forest Service by Utah State University and summarized in the Idaho/Western Wyoming, Landcover Classification, Report and Metadata. The Utah State University vegetation classification identified 132 vegetation classes. In an attempt to improve accuracy, the Bridger-Teton National Forest condensed the 132 classes into 14 classes. Map 3.2.3a displays the vegetation classes in the assessment area.

Table 3.2.3a. Vegetation Classes within the Middle Greys Watershed

Vegetation Class	Number of Acres	Percent of Watershed	Percent of Acres Forested
Subalpine fir	35,939	33	56
Sagebrush Shrubland	19,746	18	--
Lodgepole pine	16,521	15	26
Aspen	11,199	10	17
Rock/Barren	9,994	9	--
Meadow	6,173	6	--
Herbland	4,180	4	--
Riparian	2,668	2	--
Shrubland	1,832	2	--
Whitebark pine	485	0.5	0.5
Douglas-fir	387	0.5	0.5
Englemann spruce	0	0	0
Developed	0	0	--
Water	11	0	--
TOTAL	**109,135**	**100**	**100**

Map 3.2.3a Dominant Vegetation



Bridger-Teton National Forest
Greys River Ranger District

N

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Forest Type

- Aspen
- Douglas Fir
- Herbland
- Meadow
- Lodgepole Pine
- Riparian
- Sagebrush Shrubland
- Shrubland
- Subalpine Fir
- Whitebark Pine
- Water
- Rock/Barren

Subalpine fir (*Abies lasiocarpa*)
Subalpine fir is generally found in the assessment area on cool, moist sites characterized by cold winters and short, cool summers. It is the most shade tolerant of the tree species in the area and the least fire resistant. On most sites in the assessment area, it is the climax species. Engelmann spruce is a common species found in subalpine fir habitat types and together they make up the commonly referred to "spruce-fir" community.

Of the 64, 531 acres that are forested in the assessment area, 35,939 acres (56%) are dominated by subalpine fir. Structural stages of this vegetation class are not balanced in the assessment area. Almost all (98%) is in the mature to old age class with the remaining 2% in the seedling/sapling or young forest stage.

The 2004 Aerial Insect and Disease Detection Survey (map3.2.3b) does not show any epidemics in subalpine fir within the assessment area. Some defoliation from western spruce budworm is present in the Little Elk Creek drainage and small pockets of mortality, most likely due to root rot, are present along the eastern portion of the assessment area from Blind Bull drainage south to Twin Creek drainage.

Estimated fire return intervals for this forest type range from 50 to 500 years depending on slope, aspect and elevation (Bradley, et.al. 1992)

Lodgepole pine (*Pinus contorta*)
Lodgepole pine is a major seral tree species in the assessment area. It is shade tolerant and vulnerable to fire, although extremely successful at regenerating itself following fire. This tree is generally found in cold sites or frost pockets and is considered a pioneer species after a major disturbance.

Of the 64, 531 acres that are forested in the assessment area, 12,041 acres (26%) are dominated by lodgepole pine fir. Structural stages of this vegetation class are not balanced in the assessment area. Half the acreage (50%) is in the mature to old age class, 14% is within the young to mid-aged class, and the remaining 36% in the seedling/sapling or young forest stage.

The Detection Survey does not show any insect or disease problems in lodgepole pine within the assessment area. Mortality from mountain pine beetle is most likely present, but was not detected. Dwarf mistletoe is known to occur in the area at endemic levels. Considering that over half of this forest type is mature and the Forest is experiencing a mountain pine beetle epidemic; high mortality in lodgepole pine can be expected in overstocked stands within the next few years. Estimated fire return intervals for this forest type range from 50 to 500 years depending on slope, aspect, elevation and species mix (Bradley, et.al. 1992).

Aspen (*Populus tremuloides*)
Aspen is also a major seral tree species in the assessment area and is considered to be an aggressive pioneer species. This hardwood tree is a clonal organism with an extensive lateral root system. The individual stems are fast-growing, relatively short-lived, and

easily killed by fire (although aspen stands can be difficult to burn). The clone itself is long-lived and very resistant to fire. It is a shade intolerant tree that primarily reproduces vegetatively. Reproduction is stimulated by killing or removing the overstory stems of the clone. When the stems are killed or removed, the source of auxin is removed, and the clone sends up new suckers from the root system to replace the stems that died.

Of the 64, 531 acres that are forested in the assessment area, 11,199 acres (17%) are dominated by aspen. Structural stages of this vegetation class are not balanced in the assessment area. All of the aspen (100%) is in the mature to old age class. This makes the stands very susceptible to insect and disease problems and conifer encroachment.

The Detection Survey does not show any insect or disease problems in aspen stands within the assessment area. Heartrot and butt rot, common problems associated with mature aspen, are most likely present, but were not detected.

Estimated fire return intervals for this forest type range from 40 to 100 years. This cover type is very fire dependent to maintain it on the landscape (Bradley, et.al. 1992)

Whitebark pine (*Pinus albicaulis*)

Whitebark pine is generally found occupying high elevation sites at the timberline or rocky sites in the assessment area. Its distribution is determined, in part, by the seed caching of birds and rodents (BTNF, 1997). It is moderately fire resistant. The characteristically open stand structure and its common occurrence on unproductive sites reduce its vulnerability to fire (Bradley, et al., 1992). Where whitebark pine is present, it may be both the seral and climax species.

Of the 64, 531 acres that are forested in the assessment area, only 485 acres (0.5%) are dominated by whitebark pine. Structural stages of this vegetation class species are not balanced in the assessment area. All of it (100%) is in the mature to old age class.

The Detection Survey does not show any insect and disease epidemics in whitebark pine within the assessment area. Some small pockets of mortality caused by mountain pine beetle were detected in the Deadman, Blind Bull, and Bug Creek drainages, as well as several pockets in the high elevations of North Fork Sheep Creek drainage. It is likely that some of the mature trees are infested with white pine blister rust, an exotic disease. The current drought, infestation with blister rust and competition with other conifer species makes whitebark very susceptible to mountain pine beetle attack.

Estimated fire return intervals for this forest type range from 50 to 300 years. Fires were local in effect and rarely burned large acreages. The greatest threat of stand replacing fires came from lower elevation fires burning into whitebark pine areas. (Bradley, et.al. 1992)

Douglas-fir (*Pseudotsuga menziesii*)

In the assessment area, Douglas- fir is located on sites ranging from warm and dry to cool and moist. It is moderately tolerant of shade, being more tolerant as a seedling than when

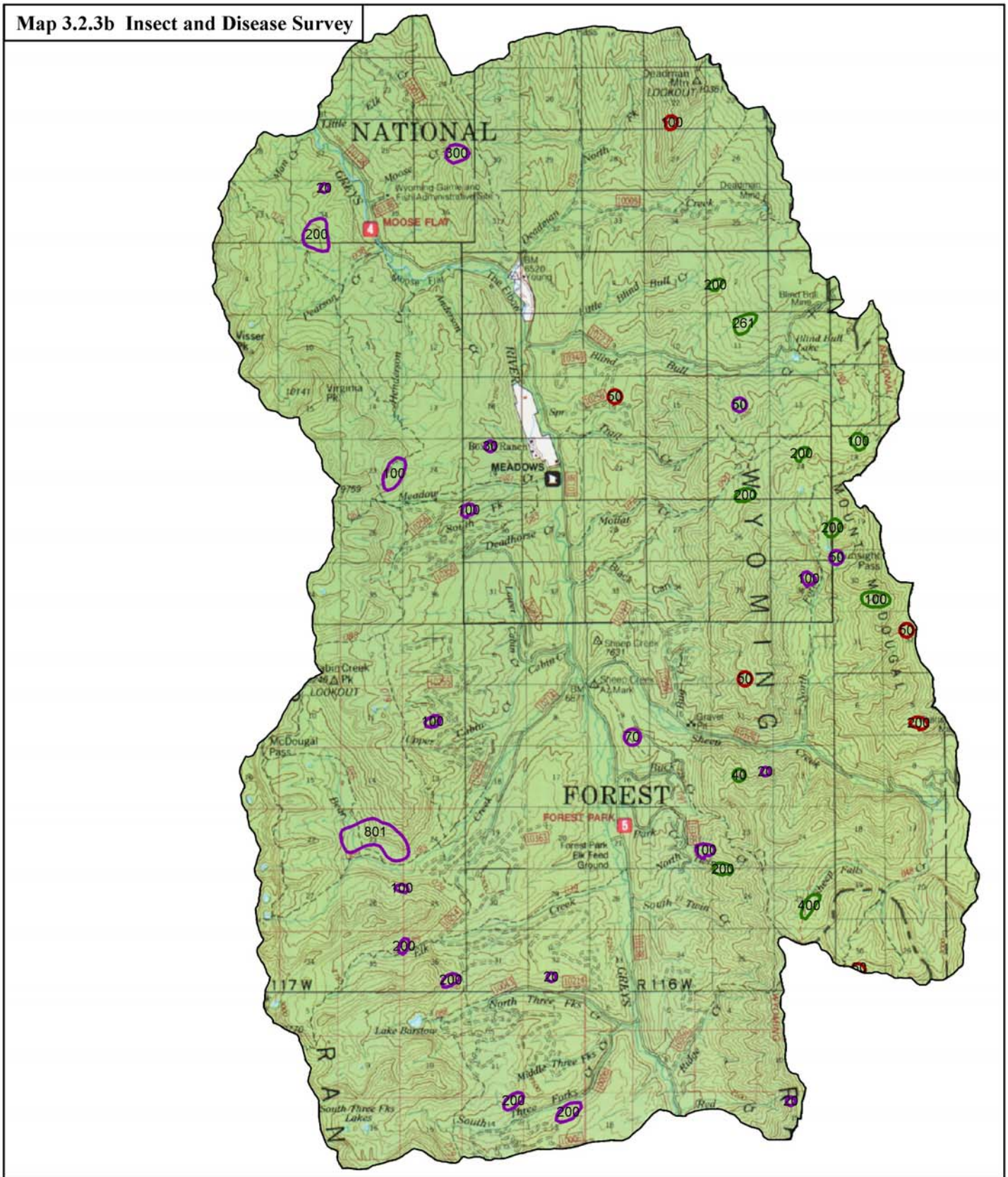
mature. Seedlings and saplings are vulnerable to fire, while mature trees are relatively fire resistant. In the assessment area, Douglas-fir occurs primarily as a seral species.

Of the 64,531 acres that are forested in the assessment area, 387 acres (0.5%) are dominated by Douglas-fir. Structural stages of this vegetation class are not balanced in the assessment area. Almost all of it (96%) is in the mature to old age class, 3% is within the young to mid-aged class, and the remaining 1% in the seedling/sapling or young forest stage.

The Detection Survey does not show any insect or disease epidemics in Douglas-fir within the assessment area. Some Pockets of mortality caused by Douglas-fir bark beetle are is present in the Pearson Creek, Meadow Creek, Bear Creek, Sheep Creek, and Three Forks drainages. Pockets of older, larger trees are more susceptible to bark beetle attack especially if there is green wind-throw or avalanched trees.

Estimated fire return intervals for this forest type range from 50 to 500 years depending on slope, aspect and elevation (Bradley, et.al. 1992)

Map 3.2.3b Insect and Disease Survey



Bridger-Teton National Forest
Greys River Ranger District

N

0 1 2 Miles

Damage Causal Agents

- Mountain Pine Beetle - Whitebark Pine
- Douglas-fir Beetle
- Subalpine Fir Mortality

- Trees Affected

Forest Vegetation Treatments

Timber harvest has occurred on approximately 5314 acres in the assessment area (5% of total assessment area, 8% of the total forested area). Harvesting began in the 1950's and continued through 2000. Approximately 4480 acres were clearcut and 834 acres were selectively cut. The clearcuts were reforested by planting lodgepole pine and through natural regeneration. Table 3.2.3b depicts the acres of timber harvest by silvicultural system and the drainage/area it took place.

As of 1998, about half of those plantations were considered "closed" while the other half were still considered "created openings". The Forest Plan (page 157) defines the Created Opening Duration Standard as "A created opening will be closed when reforestation standard is met and the area begins to take on the appearance of a young forest represented by either 95% of the trees in the cut-over area exceeding 10 feet in height or regeneration provides elk hiding cover from a horizontal ground point of view."

Those 4480 acres of plantation fall within the lodgepole pine vegetation class and within the seedling/sapling to young forest age class. The very dense stands will remain pole size trees with very little growth occurring throughout their lives. The less dense stands may become susceptible to mountain pine beetle attacks as they mature.

Table 3.2.3b. Approximate Acres of Timber Harvested by Subdrainage or Area

Subdrainage/Area	Acres of Clearcut	Acres of Selection Cut	TOTAL
South Three Forks	316	0	316
Middle Three Forks	266	0	266
North Three Forks	464	0	464
Ridge Creek	88	70	158
Elk Creek	547	0	547
North Twin Creek	63	0	63
Park Creek	201	33	234
Forest Park Bench	154	335	489
Bear Creek	419	76	495
Buck Creek	192	41	233
Bug Creek	139	38	177
Cabin Creek	326	0	326
Black Canyon	149	38	187
Deadhorse Creek	30	0	30
Meadow Creek	366	0	366
Trail Creek	248	168	416
Deadman Creek	134	35	169
Man Creek	146	0	146
Little Elk Creek	232	0	232
TOTAL	**4480**	**834**	**5314**

Desired Future Condition
The desired future condition (DFC) for each vegetation class is derived from the Bridger-Teton National Forest Properly Functioning Condition Assessment (1997) and the Greys River Landscape Level Assessment (2004). These documents are tiered to the Forest Plan and the Intermountain Regional Assessment of Properly Functioning Condition (June 3, 1996). The DFC for the assessment area will be the properly functioning condition (PFC) for each vegetation class.

Ecosystems at any temporal or special scale are said to be in "properly functioning condition" when they are dynamic and resilient to perturbations to structure, composition, and processes of their biological or physical components (USDA Forest Service, 2000). The components of PFC include structure, composition, disturbance regime, and patterns. Structure is an expression of age and size class. Composition describes species present. Disturbance regimes include natural and human-cause disturbances such as grazing, logging, wildfire, insects, and disease. Patterns are an indication of how ecosystems function among and between themselves.

Subalpine fir (*Abies lasiocarpa*)
Structure-The desired structure of this vegetation class is a balanced one that includes:
Approximately 10% in grass/forb stage,
Approximately 10% in seedling/sapling stage,
Approximately 20% in young forest,
Approximately 20% in mid-aged forest,
Approximately 20% in mature forest,
Approximately 20% in old forest
No more that 75% of subalpine fir should be in mature or old forest.

Composition-In this vegetation class, 40%-90% of the trees should be subalpine fir. Conversion of subalpine fir from other vegetation classes, including lodgepole pine, aspen, and Douglas-fir should come through human-caused disturbances and succession.

Disturbance regime-Disturbances that are within the historic range of variation for subalpine fir are endemic insect and disease populations with occasional outbreaks, with those outbreaks controlled by stand-replacing wildfire. Fire is another prime disturbance agent in this type.

Pattern-Structural classes (age classes) are distributed across the landscape.

Lodgepole pine (*Pinus contorta*)
Structure-The desired structure of this vegetation class is a balanced one that includes:
Approximately 10% in grass/forb stage
Approximately 10% in seedling/sapling stage
Approximately 20% in young forest
Approximately 20% in mid-aged forest
Approximately 20% in mature forest

Approximately 20% in old forest
No more than 60% of lodgepole pine should be in the mature or old classes. Nearly all the stands should be even-aged.

Composition-In this vegetation class, at least 60% of the trees should be lodgepole pine. Conversion of lodgepole pines stands to other conifer species (primarily subalpine fir) should be balanced by natural and human-caused disturbances.

Disturbance regime- Disturbances that are within the historic range of variation for lodgepole pine are endemic insect and disease populations, with periodic outbreaks. Lethal fires reset stand development and succession.

Pattern-A mosaic of size and structure classes occur across the landscape, but nearly all are even-aged.

Aspen (*Populus tremuloides*)
Structure-The desired structure of this vegetation class is a balanced one that includes:
Approximately 40% in grass/forb and seedling sapling stage
Approximately 30% in young and mid-aged forest
Approximately 30% in mature and old forest

Composition- In this vegetation class, conifer encroachment is minimal. No more than 15% cover should be from conifers.

Disturbance regime-Disturbances that are within the historic range of variation for aspen include endemic populations of insects and diseases, large catastrophic fires, small stand-replacing fires, and limited browsing from wildlife.

Pattern-The various structural (age) classes should be distributed across the landscape, yet reflect the natural disturbance regimes.

Whitebark pine (*Pinus albicaulis*)
Structure-The desired structure of this vegetation class is a balanced one that includes:
Approximately 10% in grass/forb stage
Approximately 15% in seedling/sapling stage
Approximately 15% in young and mid-aged forest
Approximately 30% in mature forest
Approximately 30% in old forest
Mature and old stands should not exceed 60% of the total acreage.

Composition- In this vegetation class, no less than 20% of the live overstory is whitebark pine. In seral stands replacement of whitebark pine by subalpine fir or spruce should be balanced through disturbance.

Disturbance regime- Disturbances that are within the historic range of variation for whitebark pine includes endemic insect and disease populations and mixed severity fires.

Pattern-In high elevation stands, forests are open, with canopies that do not close. At lower elevations, stands are more dense and uniform.

Douglas-fir (*Pseudotsuga menziesii*)
Structure-The desired structure of this vegetation class is a balanced one that includes:
Approximately 10% in grass/forb stage
Approximately 10% in seedling/sapling stage
Approximately 20% in young forest
Approximately 20% in mid-aged forest
Approximately 20% in mature forest
Approximately 20% in old forest
No more than 70% of this vegetation class should be in mature to old forest.

Composition- Douglas-fir dominates the overstory of the stands in this vegetation class. Subalpine fir should not occupy more than 25% of the overstory. Succession of Douglas-fir to subalpine fir is balanced through natural and human-caused disturbances.

Disturbance regime- Disturbances that are within the historic range of variation for Douglas-fir include endemic insect and disease populations with occasional outbreaks, non-lethal wildfires, and stand-replacing wildfires.

Pattern-Douglas-fir stands should be maintained. Conversion of stands to Douglas-fir should be balanced across the landscape.

Conclusions
There is little guidance from the Forest Plan, the Bridger-Teton National Forest PFC Assessment, or the Greys River Landscape Scale Assessment on what the desired species composition would be across the landscape. The PFC Assessment does describe composition, but it refers to tree species within a vegetation class, not across the landscape.

Structural classes are well described in the PFC assessment and the Greys River Landscape Scale Assessment. Stand structure is outside of the properly functioning condition in all forested vegetation classes. PFC for each vegetation class is a balanced structural class across the landscape. Table 3.2.3c depicts the current versus desired condition of vegetation classes by structure class.

Table 3.2.3c Current and Desired Structural Classes of the Forested Vegetation Classes.

Vegetation Class	Grass/Forb to Seedling/Sapling Stage		Young to Mid-Aged Forest		Mature to Old Forest	
	Current	Desired	Current	Desired	Current	Desired
Subalpine fir	2%	20%	0%	40%	98%	40%
Lodgepole pine	36%	20%	14%	40%	50%	40%
Aspen	0%	40%	0%	30%	100%	30%
Whitebark pine	0%	25%	0%	15%	100%	60%
Douglas-fir	3%	20%	1%	40%	96%	40%

Subalpine fir (*Abies lasiocarpa*)
Existing conditions include 719 acres in the seedling/sapling stage. Using PFC, the desired acres in this class is 7,188 acres. 6,469 acres needs to be converted from mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns (7,188 acres minus 719 acres). In addition, 25% of the seedling/sapling stage acres should be created each decade to keep the desired balance of structure classes (25% of 7,188 acres).

Existing conditions include 0 acres in the young/mid-aged forest stage. Using PFC, the desired acres in this class is 14,376 acres. 14,376 acres needs to be converted from mature/old forest to the young/mid-aged forest. It is difficult to create young/mid-aged forest from mature/old forest. To achieve this, growth will have to occur from existing forest at the seedling/sapling stage. Over the next 40 years, approximately 719 acres will grow into the young/mid-aged forest stage.

Summary:
•Convert 6,469 acres of subalpine fir from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns.

•Convert 1,797 acres of subalpine fir from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns each decade.

Lodgepole pine (*Pinus contorta*)
Existing conditions include 6,069 acres in the seedling/sapling stage. Using PFC, the desired acres in this class is 3,304 acres. There are no stands of lodgepole pine in the assessment area that need to be converted from mature/old forest to the seedling/sapling stage. However, 25% of the seedling/sapling stage acres should be created each decade to keep the desired balance of structure classes (25% of 3,304 acres).

Existing conditions include 2,264 acres in the young/mid-aged forest stage. Using PFC, the desired acres in this class is 6,608 acres. 4,344 acres need to be converted from

mature/old forest to the young/mid-aged forest. Since it is difficult to create young/mid-aged forest from mature/old forest, growth will have to occur from existing forest at the seedling/sapling stage. Over the next 40 years, approximately 6,069 acres will grow into the young/mid-aged forest stage.

Summary:
•Convert 826 acres of subalpine fir from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns each decade.

Aspen (*Populus tremuloides*)
There are no stands of aspen in the assessment area in the seedling/sapling stage. 4,480 acres of aspen need to be converted from mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns. Additionally, 25% of the seedling/sapling stage acres should be created each decade to keep the desired balance of structure classes (25% of 4,480 acres equals 1,120 acres).

Young/mid-aged aspen stands are lacking in the assessment area. 3,360 acres of aspen need to be converted from mature/old forest to the young/mid-aged forest. Since it is difficult to create young/mid-aged forest from mature/old forest, growth will have to occur from existing forest at the seedling/sapling stage. Since no seedling/sapling stage currently exists, it will take more than 40 years to convert aspen stands into the young/mid-aged forest stage.

Summary:
•Convert 4,480 acres of aspen from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns.

•Convert 1,120 acres of aspen from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns each decade.

Whitebark pine (*Pinus albicaulis*)
121 acres of whitebark pine needs to be converted from mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns. In addition, 25% of the seedling/sapling stage acres should be created each decade to keep the desired balance of structure classes (25% of 121 acres equals 30 acres).

73 acres of whitebark pine needs to be converted from mature/old forest to the young/mid-aged forest. Since it is difficult to create young/mid-aged forest from mature/old forest, growth will have to occur from existing forest at the seedling/sapling stage. Since no seedling/sapling stage currently exists, it will take more than 40 years to convert stands into the young/mid-aged forest stage.

Summary:
•Convert 121 acres of whitebark pine from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns.

•Convert 30 acres of whitebark pine from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns each decade.

Douglas-fir (*Pseudotsuga menziesii*)
12 acres of Douglas fir are in seedling/sapling stage. The desired acres in this class is 77 acres. 65 acres needs to be converted from mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns (77 acres minus 12 acres). Additionally, 25% of the seedling/sapling stage acres should be created each decade to keep the desired balance of structure classes (25% of 77 acres equals 19 acres).

4 acres are in the young/mid-aged forest stage. Using PFC, the desired acres in this class is 155 acres. 154 acres of Douglas-fir needs to be converted from mature/old forest to the young/mid-aged forest. It is difficult to create young/mid-aged forest from mature/old forest, growth will have to occur from existing forest at the seedling/sapling stage. Over the next 40 years, approximately 12 acres will grow into the young/mid-aged forest stage.

Summary for Douglas-fir:
•Convert 65 acres of Douglas-fir from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns.

•Convert 19 acres of Douglas-fir from the mature/old forest to the seedling/sapling stage through stand regeneration systems and/or prescribed burns each decade.

3.3 Wildlife and Fisheries

3.3.1. Wildlife

Wildlife diversity and abundance in particular parts of the watershed are influenced primarily by habitat conditions and human activity. Figure 3.3.1a illustrates the main ways in which wildlife populations and wildlife diversity are affected by habitat problems stemming from human-regulated factors. The figure is presented to show generalized cause-and-effect relationships in the Middle Greys River watershed and does not depict specific relationships. The figure also illustrates the importance of tackling problems at their lowest possible level (e.g., as far to the left as possible).

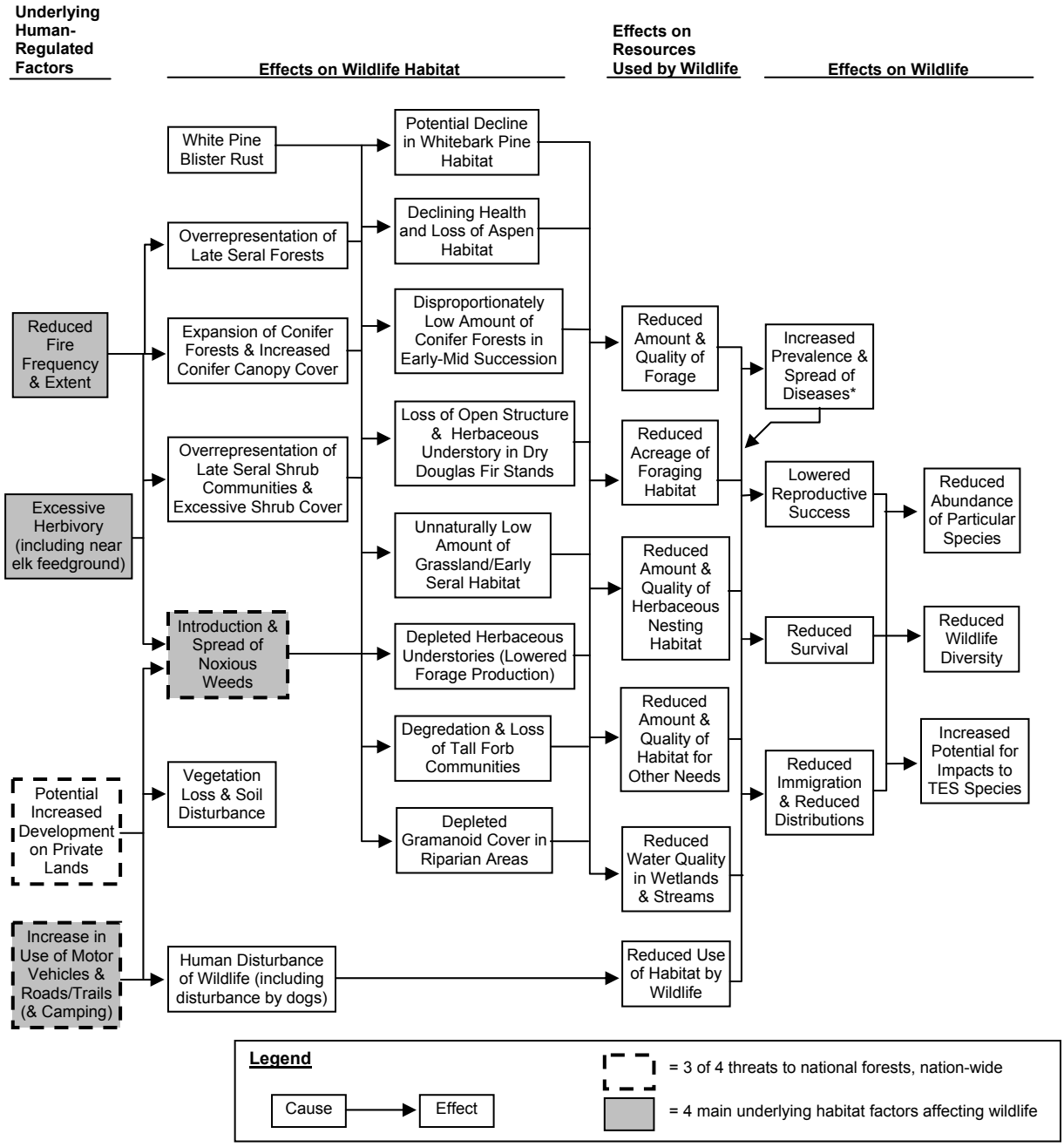


Figure 3.3.1a. Simplified flowchart illustrating factors limiting wildlife populations and diversity, and the underlying causes of those problems on the Middle Greys River watershed of the Greys River Ranger District, Bridger-Teton National Forest, Wyoming. The flowchart does not show the underlying, socio-economic causes of the human-regulated factors. (TES Species = threatened, endangered, and sensitive species.)

* Contributing factors for increased prevalence and spread of infectious diseases in elk include: (1) reduced acreage of foraging habitat on winter and transition ranges in the watershed, (2) reduced amount and quality of forage on those ranges, (3) discontinued use of historic winter ranges outside the District, and (4) winter feeding of elk at Forest Park. Winter feeding, which is managed by Wyoming Game and Fish Department, in part stems from land-use changes on historic winter ranges and is not addressed directly in the Middle Greys River WSA other than by identifying habitat restoration needs.

Wildlife Populations and Diversity

Many of the Bridger-Teton National Forest's 74 species of mammals, 208 species of birds, 6 species of amphibians and reptiles, and numerous invertebrate species are known or anticipated to occur in the assessment area. Forest Plan management indicator species that occur within the watershed or may occur within the watershed at times are listed in Table 3.3.1a. Wildlife management indicator species are identified as most representative of wildlife and their habitat overall and most effective for monitoring change.

Table 3.3.1a. Wildlife management indicator species for the Bridger-Teton National Forest, Wyoming, that apply to the middle Greys River watershed.

Harvest Species (Large Ungulates)	Ecological Indicator Species (and the habitat they represent)	Threatened/Endangered
Rock Mountain Elk	Pine Marten (old-growth)	Bald Eagle
Moose	Brewer's Sparrow (sagebrush)	Peregrine Falcon[A]
Mule Deer	Bald Eagle[B] (riparian)	Grizzly Bear (threatened)
	Aspen[B] (aspen)	
	[Bighorn Sheep[B,C]] (mountain meadow)	
	[Spotted Frog/Boreal Toad[B, C]](wetland)	

[A] No longer threatened, but identified in the Forest Plan as an management indicator species.

[B] Designated in 2005 as an ecological indicator species for the identified habitat. Bald eagles, bighorn sheep, and trumpeter swans were identified in the 1990 Forest Plan as management indicator species for threatened/endangered species or as a harvest species. Their use as management indicator species was expanded in 2005 to include representation of specified habitats.

[C] Not currently known to exist within the middle Greys River watershed.

Elk, moose, and mule deer are management indicator species and are also common in the watershed. Bighorn sheep are not known to occur in the watershed, although they historically occurred.

Spring, summer, and fall habitat conditions in the Middle Greys River watershed are sufficient to meet forest plan wildlife objective 2.1(a) for elk. Elk are common in the watershed and contribute substantially to meeting the herd objective. However, the fact that the current number of elk is near the herd objective says little about suitability of winter habitat and to some degree transition range in the watershed since artificial feeding at the Forest Park feedground sustain most of the elk in the herd unit during winter. Suitability of this habitat is important from the standpoint of reducing disease prevalence in elk (see USFS 2004), especially if chronic wasting disease were to become established.

It is unclear whether forest plan wildlife objective objective 2.1(a) is being met for moose in the watershed; it is possible that habitat conditions may be playing a role in declines in

moose numbers. The number of moose counted along the Greys River and tributaries between the Little Greys River and Sheep Creek has declined since the winter of 1990-1991.

Results of a study conducted during the 2003 hunting season (summary in Fralick 2004a) suggest that forest plan wildlife objective 2.1(a) is being met with respect to mule deer. The middle Greys River watershed comprises a small part of the summer range for the Wyoming Range mule deer herd unit. The Wyoming Range herd is substantially below objective (an estimated 32,000 deer in 2003 compared to an objective of 50,000) due primarily to poor condition of winter range in the Green River basin near Big Piney and winter range east and south of Cokeville (USFS 2004).

Sensitive Species, Ecological Indicator Species, and Species Listed under Endangered Species Act

Ecological indicator species, threatened species, and other sensitive species occurring in the watershed are described in the Greys River LSA (USFS 2004).

Table 3.3.1b. General characterization of habitat and occurrence/abundance of ecological indicator species, threatened/experimental species, and other sensitive wildlife species that occur or may occur in the middle Greys River watershed of the Greys River Ranger District, Bridger-Teton National Forest, Wyoming as of 2005.

Species	General Characterization of Key Habitats[A]	Uncommon or Common	Low Density/ Rare Visitor	Likely Occurs	Not Known to Occur
Marten[B]	late seral conifer	X			
Fisher	later seral spruce-fir				X
Wolverine	various, wide ranging		X		
Canada Lynx[C]	subalpine/lodgepole pine forests		X		
Grizzly Bear[B,C]	various, large undeveloped blocks			X	
Gray Wolf[C]	various, large undeveloped blocks		X		
Spotted Bat	various, roost in crevices high on steep limestone/sandstone cliffs				X
Western Big-Eared Bat	verious, roost in caves & outcrops				X
Common Loon	lakes > 9 acres				X
Harlequin Duck	nests in dense shrubby riparian vegetation by low-gradient streams		X		
Trumpeter Swan[B]	nests in marshes, beaver ponds, backwaters of rivers				X
Northern Goshawk	nests in late seral conifer and mixed forests	X			
Bald Eagle[B,C]	winters along rivers in the area		X		
Peregrine Falcon[B]	nests on high cliffs near water			X	
Great Gray Owl	dense lodgepole, Douglas fir, and aspen forests with semi-open areas		X		
Boreal Owl	high-elevation spruce-fir forests		X		
Flammulated Owl	late seral, open pine and aspen				X

Northern Three-toed Woodpecker	late seral conifer forests; fire-killed trees and old conifers important			X		
Brewers Sparrow [B]	sagebrush	X				
Columbia Spotted Frog [B]	breeds in marshy edges of ponds and lakes, springs, and slow streams			X		
Boreal Toad [B]	breeds in marshy edges of ponds and lakes, and slow streams				X	
Aspen [B]	aspen stands (seral to subalpine fir and Douglas fir)	X				
Payson's Bladderpod	limestone outcrops with scant soil development			X?		X?
Payson's Milkvetch	disturbed areas			X		
Boreal Draba	shaded streamsides and mesic north-facing subalpine fir or Englemann spruce forests on limestone or dolomite substrates				X	

[A] See Fertig and Marriott (1993), Hayword and Verner 1994), Ruggiero et al. (1994), Patla (2000), Nicholoff (2003), and USFS (2004a:104-114, USFS 2004b) for details on habitat characteristics and habitat requirements.
[B] Ecological Indicator Species or otherwise listed as a management indicator species (e.g., Threatened/Endangered Species).
[C] Threatened or Endangered Species under the Endangered Species Act (wolves in Wyoming are designated as "experimental").

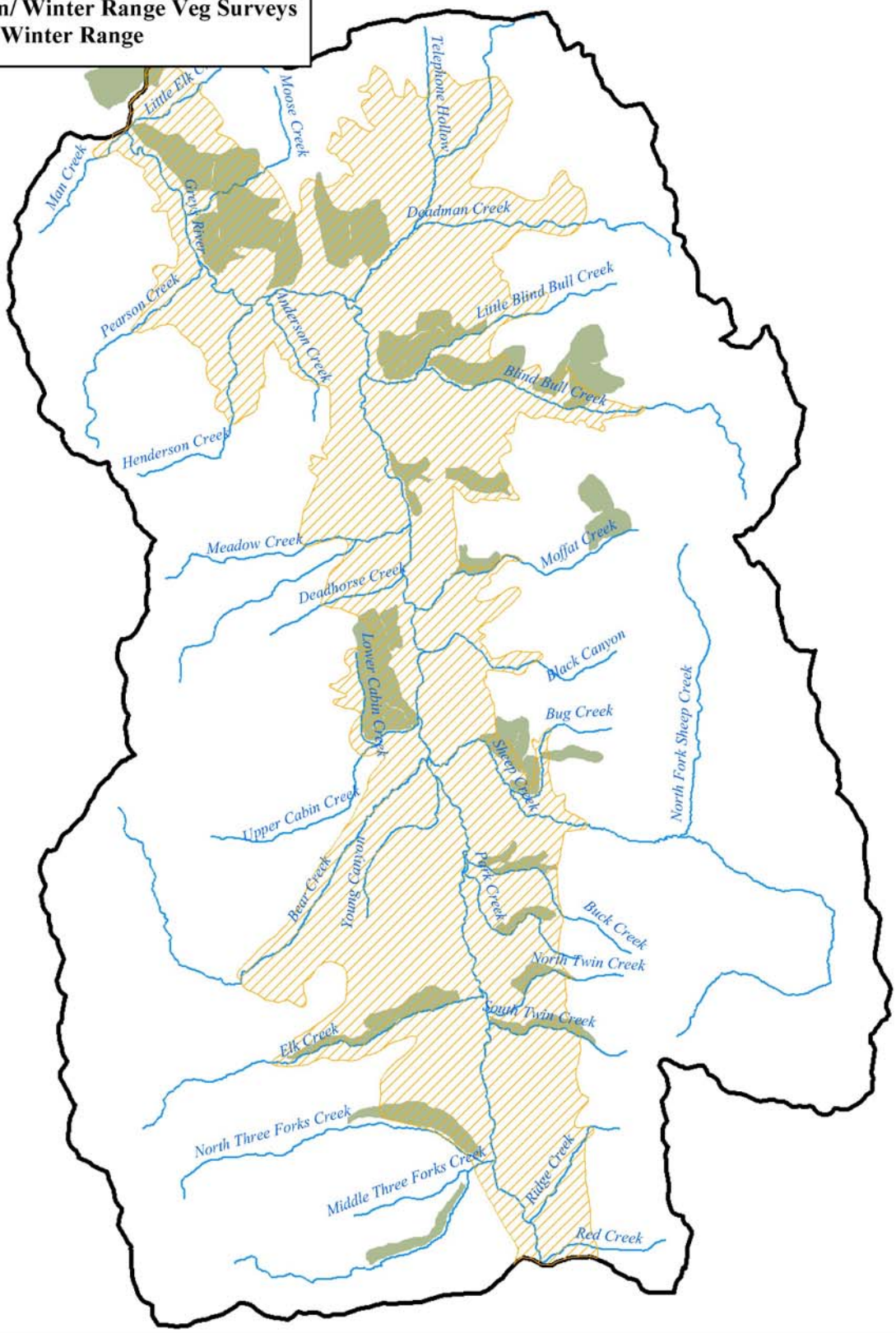
The "Greys River Middle" Lynx Analysis Unit (LAU) encompasses about 75% of the assessment area, and the "Greys River Northeast" LAU encompasses the remainder, taking in the Man, Pearson, Henderson, Anderson, Elk, Moose, and Deadman drainages. The Greys River Middle LAU does not encompass any lands outside of the middle Greys River watershed; this LAU is 82,225 acres, of which about 29,269 acres (35.6% of the LAU) are designated as lynx habitat. In the assessment area, vegetation classified as "lynx habitat" does not include non-forested vegetation.

Key Factors Affecting Habitat Conditions and Wildlife Use of Habitat

There are four human-regulated factors that have contributed to conditions and trends in habitat and habitat use by wildlife in the Middle Greys River watershed (shaded boxes of Figure 3.3.1a).

- **Reduced fire frequency**
- **Reduced habitat quality and effectiveness due to roads/trails and motorized vehicles.**
- **Introduction and spread of noxious weeds**
- **Herbivory by livestock and native ungulates**

Map 3.3.1a Transition/ Winter Range Veg Surveys & Elk/Moose Crucial Winter Range



Bridger-Teton National Forest
Greys River Ranger District

0 1 2 Miles

Legend

Elk/ Moose Crucial Winter Range

Transition/ Winter Range Vegetation Surveys 1990, 91, 95

Habitat and Habitat Use by Wildlife

Thirty years ago, Gruell (1975) stated that, "Despite a trend toward advancing succession and reduced carrying capacity, the ecosystem (Greys River Ranger District) continues to support good wildlife populations..." This still holds true today, although conditions have moved further away from proper functioning conditions and carrying capacity likely has declined. The Greys River LSA (USFS 2004) addressed the existing status of habitat conditions for individual species and groups of species and these characterizations are applicable to the assessment area.

Table 3.3.1c. Levels of importance and urgency of addressing each of several wildlife-habitat issue categories in the Middle Greys River watershed. Issue categories are identified by vegetation class and habitat-related issue.

	TIMELINESS OF ADDRESSING THE ISSUE	
LEVEL OF IMPORTANCE OF THE ISSUE	**Urgent**	**Address Sometime Soon**
Crucial	• Aspen Habitat	—
Important	• Roads/Trails & Motorized Recreation • Noxious Weeds (riparian, sagebrush) • Open Space (private inholdings) • Tall Forb/Meadow Communities	• Sagebrush and Mountain Shrubland Habitat • Lodgepole Pine Habitat • Subalpine Fir/Douglas-Fir/Mixed Conifer Habitat • Tall Forb Communities (Wyethia dominated)
Moderately Important	—	• Dry Douglas-Fir Habitat • Whitebark/Limber Pine Habitat • Riparian (aside from vehicles/roads, nox. weeds)

Each of the issue categories identified in Table 3.3.1c are described below, in the order presented in the table. The following sections also describe in more detail the habitat problems and implications to wildlife generally depicted in Map 3.3.1a.

Aspen Habitat, Urgent and Crucial Issue:

Throughout the Middle Greys River watershed (except DFC 9A) aspen stands are managed for their value as wildlife habitat, with emphasis on browse and cover for big-game species (USFS 1990). The condition of aspen communities in the Middle Greys River watershed does not reflect desired conditions. Aspen stands in the watershed, as with other parts of the Greys River drainage, are in the process of over-maturing and deteriorating, and the acreage of aspen habitat is declining (Gruell 1975; Gruell 1980a,b; USFS 1983; USFS 2004). Causes for the decline in aspen include reduced fire frequency, livestock grazing (Houston 1973, Loope and Gruell 1973, Gruell 1975, Bartos et al. 1998, Kay 1998, Singer et al. 1998, White et al.1998) and the altered relationship between predators and elk.

Healthy aspen stands contribute the greatest amount of all habitats to the biological diversity of the watershed. Ecologically intact and healthy aspen stands in the southern Greater Yellowstone Ecosystem have more than 200 vertebrate wildlife species, including as many as 76-88 species of birds (Salt 1957, Anderson 2002, Dobkin et al. 2002, Wyoming Partners in Flight 2003). Twenty-three "core" species of birds, all neotropical migrants, may be common in healthy aspen stands and other habitats (Dobkin

et al. 2002). Aspen habitat is important for sustaining ruffed grouse provide habitat for elk (Murie 1951, Gruell 1975, Boyce 1989, Toweill and Thomas 2002) and are important for mule deer and moose. The interspersion of aspen and sagebrush appears to be an important attribute elevating the desirability of areas for elk calving (Gruell 1975).

In 1990, 1991, and 1995, WGFD and Forest Service personnel inventoried aspen stands in several drainages in the middle Greys River watershed (WGFD files, Jackson). Surveyed aspen stands in several drainages: Moose Creek, lower Deadman Creek, south-facing slopes between Moose and Deadman Creek, Trail Creek, Moffat Creek, Bug Creek, south-facing slopes just west of Bug Creek, Buck Creek, Park Creek, South Twin Creek, and Elk Creek. are predominantly mature aspen trees with conifer encroachment. None of the surveyed aspen stands appeared to be in healthy condition (Map 3.3.1b). Approximately 70% (7,800 acres) of aspen in the Greys River drainage needs to be treated.

Roads/Trails and Motorized Vehicle Activity, Urgent and Crucial Issue:

Roads/trails and motorized vehicle activity is increasingly becoming a factor affecting wildlife habitat and wildlife in the Middle Greys River watershed. While limited site-specific information is available on the effects to wildlife habitat and wildlife, a considerable amount of research has demonstrated the adverse impacts roads/trails and motorized vehicle activity have on habitat and wildlife. There is sufficient information to demonstrate that larger numbers and miles of roads and trails used by motorized vehicles will have incrementally greater adverse impacts across a wide range of wildlife resources in the watershed. There is a need to address the increase in user-created trails and roads from the standpoint of wildlife habitat and wildlife.

Roads, trails, and motorized vehicles cumulatively affect wildlife in the watershed in several ways:

- **Transport of human activity.** The Greys River Road allows large numbers of people and their all-terrain vehicles, motorcycles (dirt bikes), horses, and snowmobiles well into the Middle Greys River watershed. Any future improvements to the road above the Forest Park feedground could potentially increase the level of impacts further up the road.

- **Human disturbance.** A fundamental principle of wildlife management is that the presence and activities of people can reduce or eliminate the use of otherwise suitable habitat by particular species and groups of wildlife (Thomas et al. 1979a, Knight and Gutzwiller 1995, Canfield et al. 1999, Skovlin et al. 2002). In the Middle Greys River watershed, this mainly is a consequence of motorized vehicles (including snowmobiles), horseback riding, hiking, camping, fishing, and other activities in relation to the "security" that different forest communities provide.

- **Mortality.** For most wildlife species, mortality along roadways likely has little effect on populations in the Middle Greys River watershed. However, roadkill can have substantial effects on some wildlife populations, such as amphibians, depending on locations of roads and trails, movement patterns of the species, and timing of the

movements relative to timing and extent of vehicle traffic (Gomez 1994, Maxell and Hokit 1999, Waller et al. (1999).

- **Habitat loss and changes in vegetation composition and structure.** The presence of roads and trails in the Middle Greys River watershed have reduced the amount of habitat available to some wildlife species, particularly those inhabiting riparian corridors and other limited habitats like seeps, springs, and seasonally wet areas (Cole and Landres 1995, Douglass et al. 1999, Maxell and Hokit 1999, Patla 2000). Motorized vehicle activity, including snowmobiles, can also alter the composition and structure of plant communities (Cole and Landres 1995, Douglass et al. 1999, Stangl 1999).

- **Noxious weeds.** By providing a conduit for transporting weed seeds into and throughout the watershed (via vehicles, horses, people's clothing, dogs) and by providing optimal sites for germination, the Greys River Road and other roads/trails may contribute to the introduction and spread of noxious weeds more so than any other factor.

- **Soil erosion and water quality.** Roads and trails also indirectly affect wildlife habitat in the watershed by increasing soil erosion, redirecting or blocking water flows, and gullying (Cole and Landres 1995, Douglass et al. 1999, Meyer 2002).

- **Transport of disease agents.** The threat of diseases impacting amphibians and other wildlife may be elevated because equipment, livestock, and pets that can carry disease organisms can be transported throughout large areas given extensive road/trail systems (Patla 2000).

Of these, human disturbance may be the most important factor for wildlife. Because motorized vehicles have a major influence on the level of human disturbance and because the number and length of user-created trails continues to grow in the watershed, the density of roads and trails used by motorized vehicles is of major issue that needs to be addressed. For example, it is well established through extensive research that as the density of open roads increases in an area, elk use of the area declines (Thomas et al. 1979a; Lyons 1983, Canfield et al. 1999; Wisdom and Cook 2000; Skovlin et al. 2002). Wisdom and Cook (2000:722) cited two studies showing that reductions in elk use of habitat have been measured as far away as 1.8 miles from roads. Road management standards in the Forest Plan identify targeted densities of roads for each of the DFC areas (Table 3.3.1d, Map 3.0). Additionally, desired future conditions include an average of no more than 1 mile of trail per square mile in DFCs 3, 10, and 12.

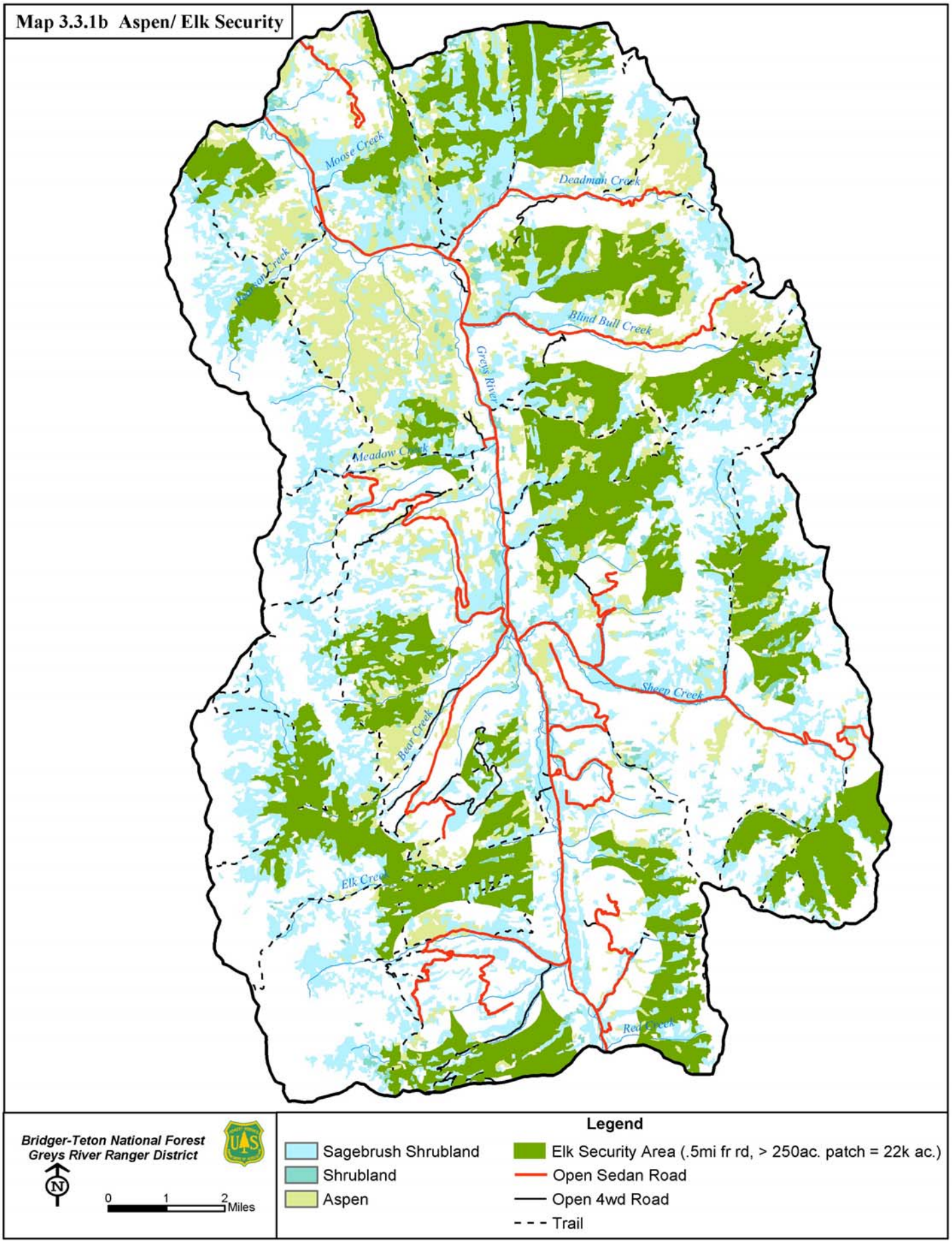

Map 3.3.1b Aspen/ Elk Security
Moose Creek
Deadman Creek
Blind Bull Creek
Greys River
Meadow Creek
Sheep Creek
Bear Creek
Elk Creek
Red Creek
Bridger-Teton National Forest
Greys River Ranger District
N
0 1 2 Miles
Legend
Sagebrush Shrubland
Shrubland
Aspen
Elk Security Area (.5mi fr rd, > 250ac. patch = 22k ac.)
Open Sedan Road
Open 4wd Road
Trail

Table 3.3.1d. Miles of road and road density estimates for DFCs 1B, 3, 10, and 12 in the Middle Greys River watershed (the DFC classes for which BTNF road management standards exist). Road density is expressed in terms of miles of road per square mile.

		Miles of Road Open			Road Density		
DFC	DFC Acres (% of WSA)	Open 4wd	Sedan	Total	Existing	BTNF Standard (Average)	BTNF Standard (5-year Range)
1B	33,343 (31%)	14	37	51	0.98	1.5	0.75-1.75
3	8,074 (7%)	3	19	22	1.74	1	0.25-1.25
10	22,113 (20%)	5	17	22	0.64	1	0.25-1.25
12	36,841 (34%)		5	5	0.09	0.25	0.0-0.5

Table 3.3.1d summarizes densities of open roads in each DFC class for which road management standards apply and the standards for each. These estimates, however, do not reflect the use of closed roads and growing number and length of user-created motorized trails.

Estimates of road densities by DFC class (Table 3.3.1d) can approximate the effects of motor vehicles on elk in the Middle Greys River watershed. Densities in Table 3.3.1d. do not reflect the use of closed roads and the growing number and length of user-created motorized trails. The estimated effects on elk by DFC may be considered minimum estimates of effects or underestimates.

- **DFC 1B –** The density of open roads is consistent with the BTNF road management standard. If the density of roads and trails actually used by motorized vehicles was as it is depicted in (Table 3.3.1d; i.e., about 1 mile of road to every square mile of habitat), elk use in nearly one-third of the watershed would be roughly 60% of potential (i.e., 40% less than potential use), based on Lyon (1983).

- **DFC 3 –** This area is bisected by the Greys River and the Greys River Road. The existing density exceeds the road management standard, but most additional roads (i.e., those in addition to the Greys River Road) are in areas where DFC 3 is narrow and where cumulative disturbance effects of additional roads within this DFC class are likely minimal. If the density of roads and trails actually used by motor vehicles was as it is depicted in Table 3.3.1d (i.e., about 1.75 miles of open road to every square mile of habitat), elk use would be roughly 50% of potential, based on Lyon (1983).

- **DFC 10 –** The density of open roads is consistent with the BTNF road management standard. If the density of roads and trails actually used by motorized vehicles was as it is depicted in Table 3.3.1d (i.e., just over 0.6 miles of open road to every square mile of habitat), elk use would be roughly 70% of potential (i.e., 30% less than potential use), based on Lyon (1983).

- **DFC 12 –** The density of open roads is consistent with the BTNF road management standard. At a density of about 0.1 miles of open road to every square mile

of habitat, elk use is probably near potential since there appear to be few user-created motorized trails that venture into this zone.

The combined density of open roads, roads closed but still being used by motor vehicles, and user-created trails in the area from Cabin Creek to South Three Forks would appear high enough to reduce elk use of the area below what is described above for DFCs 1B and 10. However, it is not clear how much the Forest Park feedground effects this assessment (e.g., elk drawn into the feedground may counteract effects of motor vehicles in this particular area).

Human disturbance in the watershed may be highest during the hunting season, especially the first several days of the mule deer and elk seasons. Large blocks of secure habitat free of access by motorized vehicles are especially important for elk at this time of year (Hurley and Sargeant 1999, Wisdom and Cook 2000, Stalling et al. 2002). Given the advanced stage of succession in conifer forests in the assessment area, vegetative conditions are optimal for providing security cover. Security cover is estimated at approximately 22,000 acres (40% less than the potential of 36,500 acres), this assumes motorized vehicle activity is restricted to open roads (Map 3.3.1b).

Snowmobiling also has the potential to affect several species of wildlife that winter in the watershed. Forest-dwelling species with small home range sizes likely are not affected since comparatively little of the snowmobiling activity occurs in forested areas, except along trails. Wintering ungulates have the greatest potential to be impacted, especially since the main snowmobile trails are on roads that run right through the heart of narrow crucial winter range for the entire 18 miles of the watershed assessment area, plus along several spur trails that run through crucial winter range (Map 3.3.1a). Colescott and Gillingham (1998) found that snowmobile activity in the Middle Greys River watershed caused moose to move away from snowmobile activity along the Greys River Road during one winter of study. Effects were readily observable within about 160 yards of the road, and other research has shown that impacts beyond this distance may also be occurring due to marked increases in energy expenditure that can result from increased heart rate and other physiological responses (Gabrielson and Smith 1995, Picton 1999). Adverse effects of human disturbance on wintering ungulates is the primary reason for maintaining closures on the elk winter range between Moose Creek and Deadman Creek and on the Forest Park elk feedground. These are the only to areas where snowmobiling is restricted in the watershed. Snowmobiling also has the potential to affecting wide-ranging species like wolverines, and this needs to be assessed further (USFS 2004). It is also possible that some species may become habituated to snowmobiling activity along groomed trails (Canfield et al. 1999, Clark 1999).

Noxious Weeds, Urgent and Important Issue:

The introduction and spread of noxious weeds has the potential to have major adverse impact on wildlife habitat, although they presently are having minimal impacts in the watershed as a consequence of annual control. Of particular concern with respect to wildlife habitat are leafy spurge (e.g., present near Box Y Ranch, Sheep Creek, and Trail Creek), Dyers woad (present in North Three Forks), spotted knapweed (mainly down-

river, also present in vicinity of Deadman Ranch), yellow toadflax (present in isolated patches in North Fork of Sheep Creek, Ridge Creek), and musk thistle (throughout the watershed).

Open Space, Urgent and Important Issue:

Desired conditions for restoring and sustaining healthy forest ecosystems, including healthy and diverse wildlife communities, includes contiguous forest and rangelands that are not fragmented by areas of high-density development (Bosworth 2003, USFS 2004d). Box Y Ranch currently supports recreational use in the Middle Greys River watershed and while the amount of private land in the Greys River watershed is limited, possible development of private land inholdings has been identified by the interdisciplinary team as an important wildlife issue because (1) the lands are located in areas that, if developed, could have major adverse impacts on wildlife; and (2) the Deadman Ranch is adjacent to important elk, mule deer, and moose winter range. A large portion of the Deadman Ranch encompasses crucial winter range for moose and, specifically, one of the most heavily used wintering areas in the Middle Greys River watershed (unpublished WGFD data).

Tall Forb, Meadow, and Grassland Communities

Maintenance of tall forb communities in healthy condition benefit mule deer, elk, and a variety of small mammal, bird, butterflies and sustain several unique and distinct plant communities that add substantially to the watershed's biological diversity. The tall forb vegetation class can be categorized into (1) communities that have been completely lost; (2) communities that are now dominated or nearly dominated by Wyethia or western coneflower; (3) communities that still contain a diversity of tall forbs, but that continue to decline in condition; and (4) communities at properly functioning condition. Desired Future Condition for tall forb communities generally is to maintain existing stands, and for trends to be upward in terms of vigor, diversity, and ground cover (see USFS 2004 for additional details).

A major proportion of tall forb communities in the Middle Greys River watershed are in degraded condition or have been lost due to livestock grazing, especially along sheep driveways, and to a lesser degree conifers encroachment (USFS 1997, O'Brien et al. 2003). Remaining tall forb communities throughout the BTNF are at high to extreme risk if current grazing practices continue to hold the community in a degraded condition, and this appears to be pertinent to the Middle Greys River watershed (USFS 1997, O'Brien et al. 2003). There are several tall forb communities in the assessment area that still contain a diversity of tall forb species. Few tall forb communities are at properly functioning condition. Because rehabilitating seriously degraded or lost communities (e.g., those that have converted to mule ears) is impractical (USFS 1997), protecting intact and relatively intact communities from continued downward trends is crucial. Protection primarily involves livestock grazing management and noxious weed control.

Sagebrush and Mountain Shrub

Sagebrush and mountain shrub habitat is important to a wide variety of wildlife species including several management indicator species in the watershed (e.g., Brewer's sparrow, elk, mule deer, moose). Sagebrush habitat — mainly of mountain big sagebrush and subalpine big sagebrush types — comprises an estimated 22% of the middle Greys River watershed, and mountain shrub habitat comprise an estimated 2% of the watershed (Map 3.2.3a, Map 3.3.1b). Together, they comprise about one-quarter of the watershed.

Table 3.3.1e. Desired mix of successional stages of sagebrush and mountain shrub vegetation classes.

	Early Seral	Mid Seral	Late Seral
Mountain Big Sagebrush	20%	65%	15%
Subalpine Big Sagebrush	30%	70%	10%
Mountain Shrubland	25%	35%	40%

Sagebrush and mountain shrub habitats in the Middle Greys River watershed are not in a proper functioning condition, as reflected by the FRCC condition class rating of 3 (Section 3.1.1, Fire Use and Settings). Nearly 100% of the acreage of sagebrush and mountain shrub habitat are currently in a late or disclimax stage of succession, in contrast to the desired average of 10-15% for sagebrush and 40% for mountain shrubland (Table 3.3.1e). Also, sagebrush canopy cover is excessive in late seral communities, which maintains depleted understories of grasses and forbs, and conifer forests continue to expand into sagebrush and mountain shrub communities (Gruell 1975, USFS 1997). BTNF-wide, there is a high risk of losing components of sagebrush habitats important to wildlife due primarily to fire suppression and heavy livestock grazing (USFS 1997), and this appears to apply to the Middle Greys River watershed.

Overrepresentation of late seral sagebrush and mountain shrub communities in the watershed and excessive sagebrush shrub cover in late seral communities affect wildlife in several ways. For example, loss of winter range due to conifer encroachment and lower-than-potential production of herbaceous forage and browse may contribute to higher levels of disease prevalence in elk due to greater amounts of time spent by elk on the Forest Park feedground. Key elk calving areas in the Middle Greys River watershed include areas north of Sheep and Bear Creeks, as well as upper Moffat and Trail Creeks have deteriorated from (Gruell 1975, WGFD and USFS unpublished data-1991) expansion of conifers into sagebrush communities. Long-term sustainability of healthy sagebrush habitat, including mosaics of different successional stages and productive herbaceous understories, is important to providing requirements of wildlife communities associated with sagebrush habitats. Even sagebrush-dependent species, such as Brewer’s sparrows (management indicator species for the BTNF), benefit from early seral communities since periodic conversion to early succession is needed for long-term sustainability of healthy late-seral stands of sagebrush (Wyoming Partners in Flight 2003).

Lodgepole Pine

Each successional stage of lodgepole pine is favored by particular wildlife species and groups of species, and some species benefit from a mix of successional stages across the landscape (Gruell 1975, Thomas et al. 1979b, Wyoming Partners in Flight 2003). Large blocks of mature and older lodgepole pine communities, in combination with subalpine fir and other conifer types, currently provide security cover for elk, but elk would also benefit from the creation of early seral communities provided security cover is retained. In the past, clearcutting, thinning, and fires in this vegetation class likely benefitted mule deer due to temporary increases in production of vegetation favored by them (Gruell 1975, Kie and Czeck 2000). In general, existing conditions in lodgepole pine favor species associated with mature forests, such as pine marten and goshawks. Pine martens and goshawks are generally negatively affected by fire, clearcutting, and thinning until mature forests regenerate (Anderson et al. 2004, Buskirk and Ruggiero 1994). However, species associated with early and mid seral forests are hindered due to the near lack of these communities. Old timber sales between Bear Creek and Elk Creek have regenerated with lodgepole pine creating favorable conditions for snowshoe hares which in turn benefits Lynx. Trees in these stands are maturing and crowns will eventually be out of reach of snowshoe hares.

Subalpine Fir, Englemann Spruce, and Moist Douglas Fir

Subalpine fir, Englemann spruce, and moist Douglas fir types currently occupy an estimated 33% of the watershed, or about 75% of the conifer forestland. It is anticipated that disturbances will occur in the future which will set succession back, for example, stand-replacing fires, insect epidemics, windthrow, or a combination of these (USFS 1997). An insect epidemic appears to be increasing in the region. From a wildlife perspective, any of these disturbances would set back succession and create mix of successional stages.

Subalpine fir, Englemann spruce, and moist Douglas fir is favored by particular wildlife species and groups of species benefit from a mix of successional stages across the landscape (Gruell 1975, Thomas et al. 1979b, Wyoming Partners in Flight 2003). Existing conditions in these forest types favor species associated with mature forests since nearly 100% of the types are in late succession. Large blocks of mature and old subalpine fir and other conifer forests currently provide security cover for elk, but elk would also benefit from the creation of early seral communities provided sufficient security cover is retained. Mule deer have likely been detrimentally impacted by the reduced level of disturbance in subalpine fir, Englemann spruce, and moist Douglas fir types and adjoining plant communities (Gruell 1975, Kie and Czeck 2000). Pine martens, fishers, goshawks, great gray owls, and boreal owls (all sensitive species, except pine martens; USFS 2004) have likely benefited from reduced frequency of fire in the ecosystem. Subalpine fir and subalpine fir/lodgepole pine forests are key habitats for lynx and, because lynx are largely dependent on snowshoe hares as a food source, interspersion of mid seral communities are important to lynx (see lodgepole pine discussion). Gruell (1975) also surmised that moose have benefited from the "widespread increase in subalpine fir."

Dry Douglas Fir

The dry Douglas fir type is a small subcomponent of the Douglas fir vegetation class, occurring on several south-facing slopes in the watershed, and it has important implications to wildlife as a separate category. This type occurs on south-facing slopes of the lower drainages of Elk Creek, Bear Creek, Sheep Creek, and a small number of others.

Under desired conditions, frequent ground fires would maintain an open, savannah-like setting with large, widely-spaced mature Douglas fir trees (USFS 2003). When adjacent to slopes of mountain big sagebrush, fire frequency may have ranged between 20 and 40 years (Havlina 2003) and may have been as frequent as 20-25 years (Houston 1973). Overstory Douglas fir trees are relatively fire resistant due to thick bark. Desired conditions include understories comprised of productive herbaceous vegetation and shrubs.

There currently is an unnaturally high density of young trees in the understories of mature dry Douglas fir communities. This change is due to fire suppression (USFS 2003). There is moderate BTNF-wide risk of losing biological and physical components on dry Douglas fir sites if current trends continue (USFS 1997). Despite a moderate rating, any fires in dry Douglas fir communities would have a high probability of being stand replacing, under existing conditions, which would be a major adverse impact on these sites. Fire under existing conditions would eliminate many of the mature Douglas fir trees, thereby foregoing restoration of the desired community structure for a century or more.

Dry Douglas-fir sites historically appear to have provided pockets of suitable winter and spring range for elk (due to relatively high amounts of forage from grasses, forbs, and shrubs), but high densities of young conifer trees in the understory now limits herbaceous forage production and otherwise limits habitat for associated wildlife species. This situation is probably most important for elk management because elk winter range is limited in the Greys River drainage and because restoration of historic conditions on dry Douglas-fir sites would contribute to (1) the State's Brucellosis-Feedground-Habitat objectives of improving elk transition and winter range (Clause et al. 2002) and (2) desired conditions described in the Greys River LSA (USFS 2004:177-178). Restored conditions would reduce time spent by elk on feedgrounds and could reduce disease transmission.

Whitebark Pine and Limber Pine

There is high BTNF-wide risk of losing components of whitebark and limber pine types important to wildlife if current trends continue (USFS 1997). A downward trend and high risk is predicted mainly on an anticipated increase in blister rust, the older age trees, and lack of regeneration (USFS 1997). While Smith and Hoffman (1998) did not survey whitebark pine in the Greys River drainage, they documented high levels in two of the three sites they surveyed in the area of Salt Pass and the Wyoming Range just east of the Middle Greys River watershed, indicating it is likely present in the watershed.

Nonetheless, whitebark pine stands in the southern part of the BTNF, including those in the middle Greys River watershed, appear to be in healthier condition than those in the northern part of the Forest (BTNF 1997). The risk, therefore, is not as high as it is further to the north. In the absence of periodic fire, limber pine may be shaded out by Douglas fir or subalpine fir.

The distribution of both whitebark and limber pine are determined in part by seed caching by birds and rodents. In particular, whitebark pine is noted for its production of relatively large seeds that some wildlife species find valuable, including grizzly bears. The high demand for seeds by wildlife, combined with low germination rates, sporadic seed production, and harsh site conditions result in poor reproduction rates in the BTNF.

Riparian and Wetland Areas

Riparian and wetland areas in the BTNF, including the Middle Greys River watershed, have a high risk of losing biological/physical components (USFS 1997). While the single biggest adverse impact to riparian areas and associated wildlife in the watershed appears to be the presence of roads/trails and motor vehicle activity, the current conditions and trends in riparian and wetland areas in the watershed truly reflect an accumulation of impacts from a wide variety of sources. Current conditions and trends have been caused by the presence of roads and trails, dispersed camping, fire suppression, encroachment of conifer trees, livestock grazing, noxious weeds, lowered beaver numbers, excessive elk browsing, and buildings in riparian zones (Gruell 1975, Patla 2000, USFS 1997, Douglass et al. 1999, USFS 2004a). Cumulative effects of all of these factors need to be considered in future management that may affect riparian and wetland areas. From the wildlife standpoint, this is especially important because a significant portion of the biological diversity in the middle Greys River watershed is associated with or dependant on riparian areas (Dobkin et al. 2002, Wyoming Partners in Flight 2003).

Desired Future Condition

The desired conditions for wildlife in the Middle Greys River watershed consists mainly of (1) habitat conditions represented by potential functioning conditions and FRCC reference conditions, and (2) low enough levels of human disturbance in enough areas throughout the watershed to allow the area to contribute to WGFD herd objectives and to contribute to viable populations of other native wildlife species, including threatened, endangered, and sensitive species (FSM 2602.1, USFS 1990, USFS 2004).

3.3.2. Fisheries

The assessment area has 78 acres of lakes, and 130 miles of River and perennial streams. Table 1 shows the diversity of game and non-game fish species and their relative

abundance in the assessment area. Native game and non-game fish species remain relatively abundant and make up the majority of aquatic wildlife.

There are no federally listed threatened or endangered fish species in the assessment area. The assessment area supports populations of Snake River finespotted cutthroat trout (*Oncorhynchus clarki* subsp.) that have been designated by the Forest Service Intermountain Region (USDA 1991) and the Wyoming Game and Fish Department as a sensitive fish species. This species is considered sensitive due to its limited distribution in the upper Snake River sub-basin.. Distribution of the finespotted Snake River cutthroat trout is unusual in that it overlaps that of another cutthroat subspecies, the Yellowstone. All other extant cutthroat subspecies are geographically isolated from each other (Behnke 1992). The middle Greys River supports both fluvial (resident), and ad fluvial (migrant) trout. Snake River finespotted cutthroat trout have been petitioned for listing as a threatened species under the Endangered Species Act of 1973. The petition was denied by the USFWS in 2000 and is currently being petitioned again for listing as a threatened species.

Table 3.3.2. Game and non-game fishes of the Greys River drainage, native or non-native status, and abundance (WG&FD, 2004)

Species Name	Native (Y/N)	Abundance
Snake River Cutthroat Trout	Y	Abundant
Mountain Whitefish	Y	Common
Brook Trout	N	Rare
Rainbow Trout	N	Rare
Mountain Sucker	Y	Rare
Utah Sucker	Y	Common
Mottled Sculpin	Y	Abundant
Paiute Sculpin	Y	Common

Stream habitat inventories that describe general condition and trend have been conducted by FS biologists in the 1970's through the late 1990's. Early inventories used estimates of habitat (unpublished BTNF data 1974). Recent habitat inventories utilized quantifiable habitat measurements such as bank stability, pool/riffle ratio and substrate composition (unpublished BTNF data 1978&1999). Habitat data has been collected using various methods but generally describe streams in the assessment area as being natural free flowing systems with high annual stream flow variation that limits the formation of stable stream channels. In addition, unstable geology causes mass soil movement and most upper stream segments are high gradient containing coarse substrates that do not provide good spawning habitat and limit over-wintering habitat. Human activities (Past timber harvest activities, livestock grazing, and roads) contribute sediment into the streams, limiting available spawning habit and aggravating mass soil movement (unpublished BTNF data1974 &1982), (WG&F 1995).

Surveys to determine fish distribution, and species diversity were conducted in the assessment area in 2000 and 2002 by FS biologists. Forest Service electrofishing data indicate that trout occupy approximately 74% of the perennial stream length sampled,

and cutthroat trout are present in 92% of the perennial stream length occupied by trout. WG&FD estimates trout populations of 80 fish per mile for the main channel of the Greys River. Drought conditions and cold water temperatures contribute to a low recruitment of juvenile fish to the population (WG&FD 2004).

Desired Future Condition

Fisheries habitat in the assessment area varies from high elevation streams and small alpine lakes to mid-elevation rivers and streams. Multiple use management and private land in-holdings influence habitat, but across the assessment area as a whole, the assemblage of native fish and habitat has remained intact. Overall aquatic habitat is in good to fair condition. The major causes of degraded habitat in the assessment area are unstable land mass movement aggravated by past timber harvest, associated roads, past and current livestock grazing, dispersed recreation and travel management issues. Map 3.4.1a and Table 3.4.1 identifies culverts in the assessment area that are sources of sediment delivery to streams and maybe fish barriers. Overall fisheries in the assessment area are near Desired Future Condition.

3.4. Watershed Management

3.4.1. Hydrology

The Middle Greys assessment area includes four 6th code watersheds with elevations ranging from 6347 to 10,973 feet. The drainage pattern is typically trellis with major stream confluences occurring at right angles to the Greys River. Total stream channels consist of 130 miles of perennial and 200 miles of intermittent. Table 3.4.1 displays the area, elevation range and miles of perennial and intermittent channels for each 6th code watershed within the assessment area.

Table 3.4.1a. Watershed Drainages Areas, Elevation Ranges and Channels

6th Order Watershed	sub-watershed area (acres)	Elevation Range (feet)	Perennial channels (miles)	Intermittent channels (miles)
Deadman Creek	26911	6347 - 10,331	25	70
Blind Bull Creek	29899	6533 - 10,252	35	50
Sheep Creek	17495	6792 - 10,973	20	30
Bear Creek	34831	6792 - 10,848	50	50

The majority of the precipitation falls in the higher elevations as snowfall. However, early spring and late summer rain storms can contribute significant amounts of precipitation. The Blind Bull Summit Snotel Station (National Resource Conservation Service Station ID 10g02s) is located at 8900 feet in the Blind Bull Creek sub-watershed. The maximum Snow Water Equivalent (SWE) occurs in April or May; the average annual maximum SWE for the period of record (1981-2004) is 27 inches. Average monthly temperatures at the station for the period of record (1986-2004) range 15º – 55º

F. Average annual accumulated precipitation for the period of record (1981-2004) is 30.5 inches.

The U.S Geological Survey (USGS) maintains a stream flow gaging station on the Greys River, downstream of the assessment area, elevation 5,729 feet (USGS gage #13023000). Although the station is below the assessment area, base flows, peak flows, and the general nature of the hydrograph can be observed and are displayed in Table 3.4.1b.

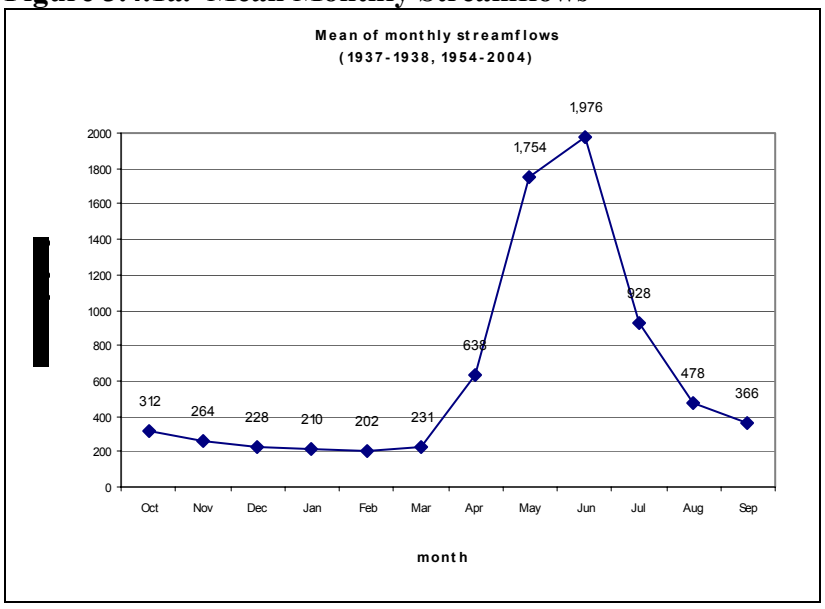
Table 3.4.1b. Annual and Peak Flows at the USGS Greys River Gaging Station (#13023000)

annual mean flow (1938, 1954-2003)		**peak flows** (1918, 1937-38, 1954-2003)		top three peak flows of record
ave 640 cfs	range 334-1018 cfs	ave 3376 cfs	range 650-7230 cfs	7230, 6090, 5220 cfs

cfs = cubic feet per second
peak flows based on maximum daily average

The majority of the snowmelt runoff occurs April – July. Base flows occur December – March and average 218 cfs. Mean monthly streamflows (1937-38, 1954-2004) at the gaging station are shown below in Figure 3.4.1a.

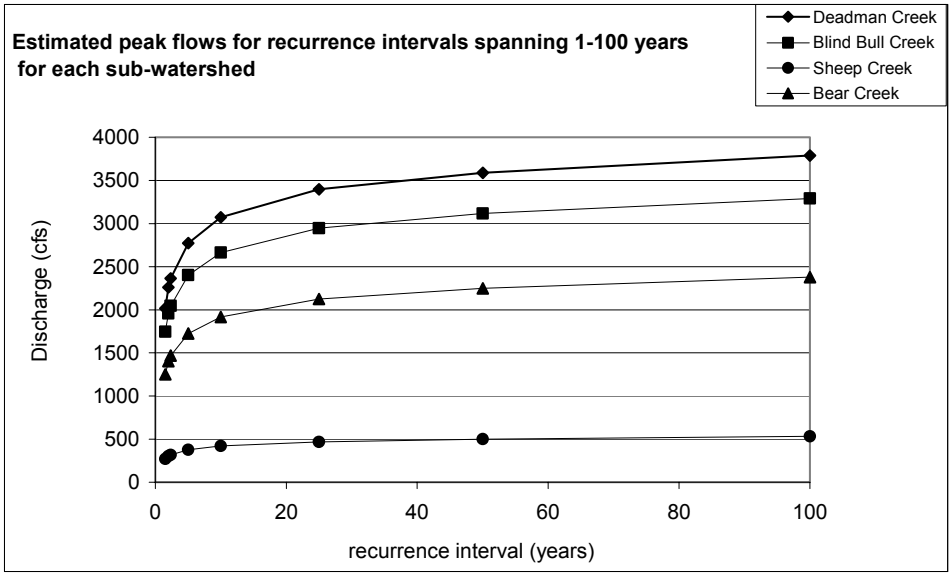
Figure 3.4.1a. Mean Monthly Streamflows



Indirect methods (Peak Flow Characteristics of Wyoming Streams: U.S. Geological Survey Water-Resources Investigations Report 03-4107) can be used to estimate flows within the sub-watersheds. The regional regression equations are based on mean January precipitation and watershed area. Figure 3.4.1b displays peak flows for recurrence

intervals spanning 1-100 years that were estimated at the furthest downstream point on the Greys River for each sub-watershed (e.g. Sheep Creek at confluence with Greys River for corresponding sub-watershed).

Figure 3.4.1b. Estimated Peak Flows



The indirect methods yield lower peak flows than those calculated using the distributions with USGS gaging station data (GRLSA 2004). However, the relative input generated by each sub-watershed is still observed.

Existing Conditions

The Inland West Watershed Initiative (IWWI) defines the Blind Bull and Deadman Creek sub-watersheds as having a *low* geomorphic integrity while Sheep Creek and Bear Creek sub-watersheds have a *moderate* geomorphic integrity. Low integrity indicates that the watershed is in a degraded condition with greater than 20% disturbance and non-functioning; moderate ratings indicate a damaged system with disturbance of less than 20% and functioning at risk. Low and moderate ratings are primarily due to fire suppression, road building, and livestock grazing (GRLSA 2004).

IWWI defines the Sheep Creek sub-watershed with moderate water quality integrity and the remaining 3 sub-watersheds with low water quality integrity. Watersheds with moderate integrity are those where only a minor part (less than 20%) of segment miles are damaged; watersheds with low integrity are those where a major part (more than 20%) of segment miles are damaged.

For both the geomorphic and water quality integrity data sets, the premise is watersheds of high integrity are relatively pristine; watersheds of moderate integrity can recover in the short-term either naturally or through revised management with minimal capital investment; and watersheds of low integrity cannot recover without major capital investment and revised management that complements the recovery. Although the ratings are subjective, they are relative to determinations for sub-watersheds across the Greater

Yellowstone Area in addition to providing a reconnaissance-level *estimate* of geomorphic and water quality conditions.

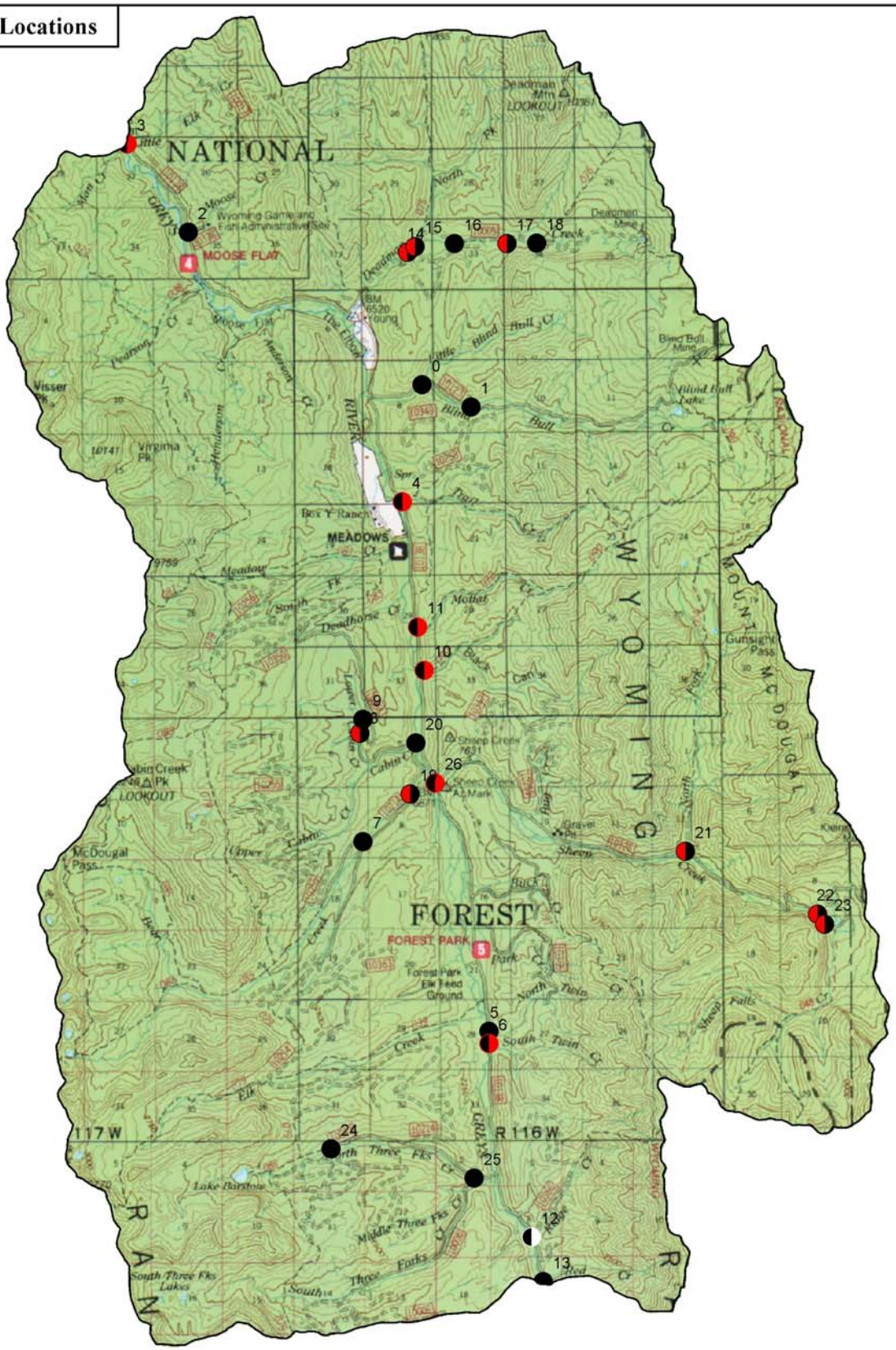
There are no 303(d) listed waters in the assessment area. However, Bridger-Teton field crews have identified high channel bed fine sediment in the Greys River upstream of the assessment area[1] and high Total Suspended Solids (TSS) concentration within the Blind Bull Creek sub-watershed[2]. These initial samples indicate a need for further assessment.

Culvert Inventories conducted in 1999 and 2003 assessed stream crossings as to whether sediment delivery to the channel was occurring at that site. Sediment delivery was assessed by degree of slope, and presence of vegetation or rills. The survey also indicated as to whether the crossing was a migration barrier for fish. Map 3.4.1a shows culvert locations within the assessment area. Table 3.4.1c identifies the stream as to whether the culvert site contributes sediment to the channel, if culvert is a migration barrier, and if a road is close to riparian area in unstable or marginally unstable slopes.

[1] TSS was collected in 1999 in Blind Bull Creek and the Greys River above the assessment area (at Shothole Springs). Blind Bull Creek (n=1) and the upper Greys River (n=14) were 4309 mg/l and 79.8 mg/l, respectively.

[2] Channel bed fine sediment in the Greys River upstream of the assessment area was sampled primarily with single grab samples; results were compared to empirical equations (GRLSA, 2004). The frequency of sediment <6.4mm was16-44%; this corresponds to 10-70% trout survival using empirical equations.

Map 3.4.1a Culvert Locations



Bridger-Teton National Forest
Greys River Ranger District

0 1 2 Miles

Sediment Delivery, Migration Barrier

- no, yes
- yes, no
- yes, yes
- yes, unkown

Table 3.4.1c

Culvert No.	STREAM	culvert = migration barrier	sediment delivery to channel at culvert site	In drainage, does road lie within 300 feet of creek *and* traverse **unstable**/marginally unstable slopes
0	little blind bull creek	yes	yes	n/a
1	blind bull creek	yes	yes	yes
2	moose creek	yes	yes	no
3	little elk creek	no	yes	n/a
4	trail creek	no	yes	n/a
5	north twin creek	yes	yes	n/a
6	south twin creek	no	yes	n/a
7	bear creek	yes	yes	**yes**
8	lower cabin creek	yes	no	no
9	lower cabin creek	yes	yes	no
10	black canyon	no	yes	n/a
11	moffat creek	no	yes	n/a
12	ridge creek	unknown	yes	**yes**
13	red creek	yes	yes	n/a
14	deadman creek	yes	no	no
15	deadman creek	yes	no	no
16	deadman creek	yes	yes	no
17	deadman creek	yes	no	no
18	deadman creek	yes	yes	no
19	bear creek	yes	no	**yes**
20	cabin creek	yes	yes	yes
21	north fork sheep creek	yes	no	no
22	sheep creek	yes	no	no
23	sheep creek	yes	no	no
24	north three forks creek	yes	yes	**yes**
25	north three forks creek	yes	yes	**yes**
26	sheep creek	no	yes	**yes**

n/a = no road up drainage *

**Note that not all of the roads within 300 feet of a perennial channel while traversing unstable soils are listed above; the above sites are creeks in which their culverts were assessed. Meadow Creek, Park Creek, and Buck Creek also have roads on unstable slopes and within 300 feet of a perennial channel but do not have culverts.*

Water Rights

Nineteen water rights have been identified in the assessment area and are shown on Map 3.4.1b and listed in table 3.4.1d. These consist of water uses associated with Forest Service facilities, grazing permits, and special use authorizations. Currently, there are no Wyoming Game and Fish Department Instream Flow permits within the assessment area; an instream flow permit exists for the Greys River downstream of the assessment area.

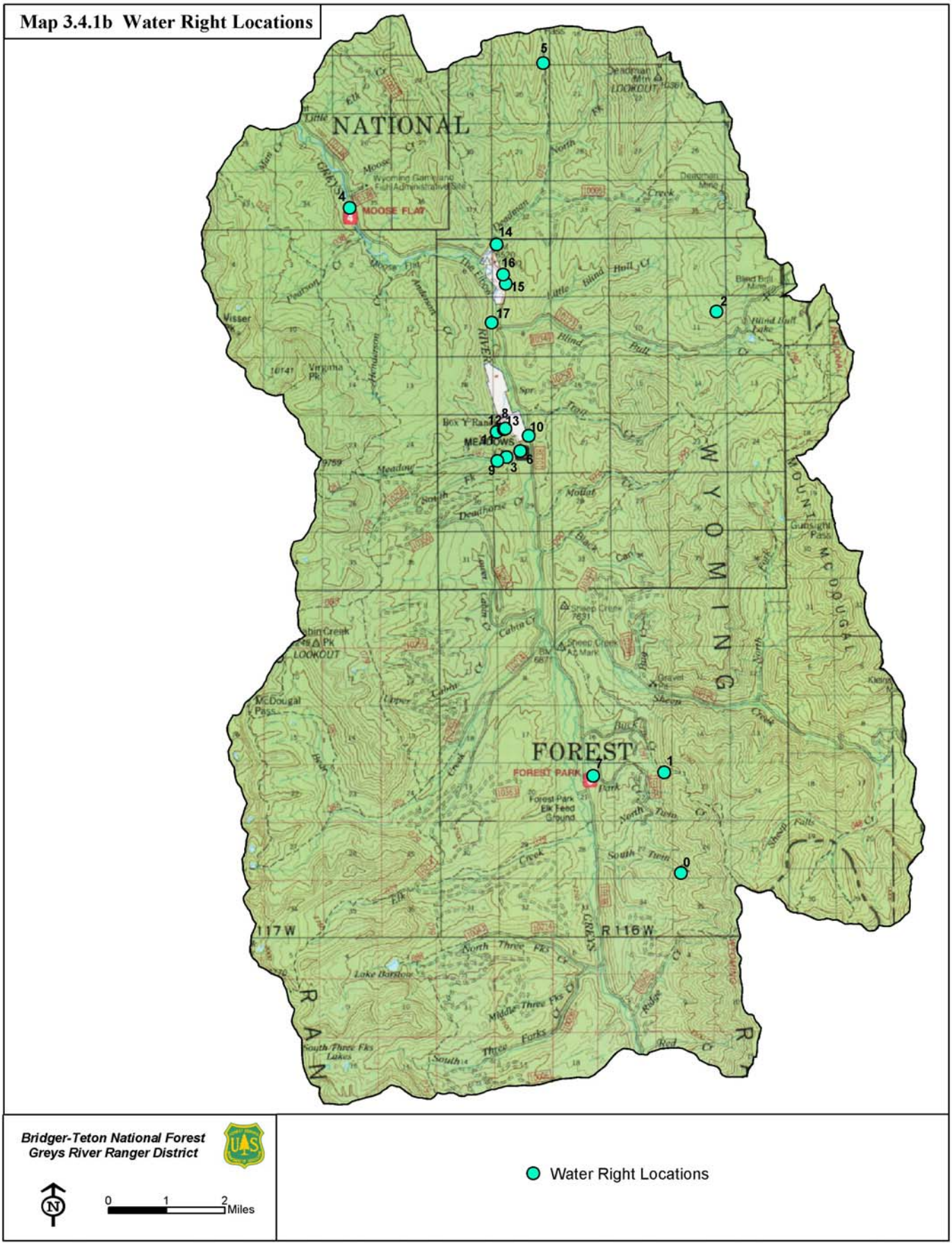

Map 3.4.1b Water Right Locations
NATIONAL
FOREST
WYOMING
MOUNTAIN
RANGE
MOOSE FLAT
FOREST PARK
MEADOWS
McDougal Pass
Bridger-Teton National Forest
Greys River Ranger District
0 1 2 Miles
Water Right Locations

Table 3.4.1d Water Rights.

Map #	State Engineer's Office Permit No.	Facility Name	Description
0	72739	South Twin Creek Spring	2
1	72732	Buck Creek Water Development	2
2	72724	Blind Bull Spring	2
3	32951	Frome #1 Pipeline	1
4	87963	Moose Flat #1	4
5	72722	Telephone Pass Spring	2
6	unknown	Meadow Guard Station #1	3
7	106148	Forest Park Well No. 1	4
8	32 5/26 Temporary filing No.	Box Y #1 Pipeline	1
9	17756	Meadows Ranger Station Irrigation Ditch	3
10	40618W	Osmond #1	1
11	148334	Young Pipeline #3	1
12	22823	Young Pipeline #2	1
13	21290	Young's Pipeline	1
14	18202	Young Ditch #2	1
15	86904W	Young Well #2	1
16	86903W	Young Well #1	1
17	18201	Young Ditch #1	1
	18205	Low Ditch	1

Description
[1]Water diverted off NF land to private landholders
[2]Grazing allotment on NF land
[3]Forest Service Facility

Desired Future Conditions

The sub-watersheds were identified through IWWI as having low and moderate geomorphic and water quality integrity. Rehabilitation efforts will need to be implemented in order to address the causal mechanisms and help bring the sub-watersheds into their historic range of variation, or a high integrity condition.

3.4.2. Soils

Physiography

The watershed assessment includes a wide array of landscapes and geomorphic settings ranging from sagebrush valleys and foot slopes to the high elevation alpine peaks. The two dominant mountain ranges are the Wyoming Range to the east and the Salt River Range to the west. These ranges demonstrate unique folding and thrust-faulting which result in a complex and repeating pattern of structural geology. Dissection of these mountains by stream cutting, glaciation, and mass wasting has modified the topography to their present form.

Structurally, the mountains occur as arcuate north-south trending ranges separated by narrow, alluvium-filled valleys. The ranges occur as large sheets of Paleozoic and Mesozoic sedimentary rocks which have been pushed, or thrust, eastward in a series of progressively younger thrust faults. Each thrust dips shallowly to the west, often placing older Paleozoic rocks in direct contact with younger Mesozoic rocks. This type of mountain building is referred to as overthrust folding and faulting. The dominant types of rocks are limestone, dolomite, mudstone, sandstone, and shale. The primary geomorphic processes in these landscapes are fluvial, colluvial and mass wasting.

Overthrust faulting in the area occurred during a time of mountain building know as the Sevier orogeny, from about 150 to 55 million years ago. During that time, a tremendous amount of thrust faulting occurred in North America, extending from Alaska to Mexico. This type of faulting resulted from compressional forces encountered when the earths crust is squeezed laterally due to tectonic movement.

The drainage pattern is typically trellis with major stream confluences occurring at right angles to the Greys River. Stream dissection is generally high, as evidenced by narrow floodplains and oversteepened valley walls. In many areas, active downcutting accentuates slope stability problems resulting in increased mass movements. Mudflows, earthflows and some slumps occur predominantly on slopes of finer textured Mesozic rocks in dip slope positions. Along the steep valley walls, debris flows of rock and mud extend onto the valley floor. In the winter, these steep valley walls are where abundant avalanches uproot large trees and earth to form avalanche chutes.

Streams and rivers typically occur in strike valleys. The landscape is highly dissected. Wetlands occur along streams and the Greys River with alluvial and glacial deposits. Lakes occur in the upper mountains where glaciers have scoured depressions and where glacial or landslide deposits have trapped seasonal runoff.

Natural Disturbances

Landslides are a common occurrence throughout the assessment area and play a major role in past and present disturbance. The landslides shown in Map 3.4.1c were originally classified into 30 or more types by the Wyoming State Geologic Survey and are generalized here into 4 major groups; block slides, slumps, flows and rock slides.

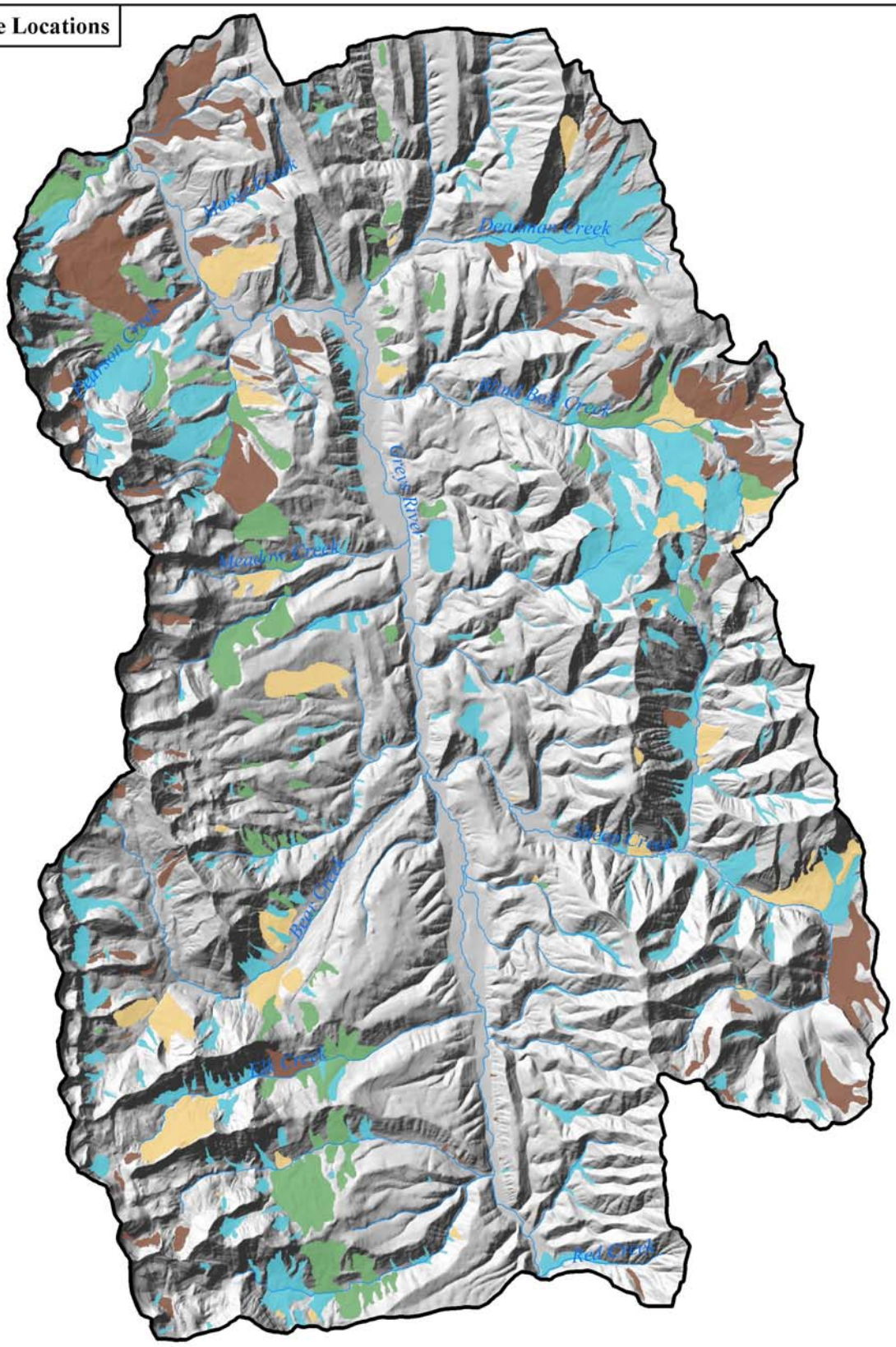
Block slides, or translational slides occur in bedrock and earth where an intact mass slides down the slope. Slumps or rotational slides occur in bedrock, debris or earth where the surface of rupture is concave upward and the mass rotates along the concave shear surface. Flows are characterized by a moving mass that has differential internal movements that are distributed throughout the mass. Most flows occur in debris and earth and can be either cohesive or non-cohesive depending on water content and material properties. Rock slides are a type of non-cohesive flow composed of dry to moist rock fragments initiated by seismic activity or by other processes. Table 3.4.2a displays the number and amount of land area in the assessment area for each landslide group. Map 3.4.1c depicts the distribution of the landslide groups for the watershed assessment area.

Table 3.4.2a. Acres of each landslide group

Landslide Group	COUNT	ACRES
Block Slides	42	2776
Flow	303	8891
Rock Slides	83	4961
Slumps	74	5443

.

Map 3.4.1c Landslide Locations



Bridger-Teton National Forest
Greys River Ranger District

0 1 2 Miles

Landslide Groups
- Block Slides
- Flows
- Rock Slides
- Slides

Map 3.4.1d delineates the assessment area by slope stability which is a function of the soil type. Primary regions of unstable slopes are at the higher elevations below the Wyoming range in the Deadman Creek and Blind Bull Creek drainages; mid-elevations on the North and South Three Forks Creek, Elk Creek and Young Canyon Creek within the Bear Creek sub-watershed; and lower elevation slopes to the east of the Greys River. Forest roads and roads within 300 feet of a perennial channel are also identified on Map 3.4.1a . Roads within 300 feet of a perennial channel occur along the majority of the Greys River; North and South Three Forks Creek, Ridge Creek, Buck Creek, Park Creek, Bear Creek in the Bear Creek sub-watershed; Sheep Creek in the Sheep Creek sub-watershed; Lower Cabin Creek, Meadow Creek, and Blind Bull Creek in the Blind Bull Creek sub-watershed; and Deadman Creek in the Deadman Creek sub-watershed.

Presences of landslides in the assessment area are shown in Map 3.4.1b. Roads, past timber management, and range management are of primary concerns for these sub-watersheds because of the presence of landslides (GRLSA 2004).

Soils

A soil survey was conducted in the area from 1987 – 1993 which provided information on soil types, associated vegetation, landforms, geology and geomorphology. The following paragraphs summarize the soil survey information.

The WSA consists of 3 primary landscape settings. These include the mountain ranges, benches, and stream-cut valleys. The mountain ranges are located on high elevation sites with dominant slope gradients from 40 to 100 percent. This landscape includes mountain peaks, cirque headwalls, cirque basins, scarp slopes, and ridges that are formed in limestone, sandstone, shale, and mudstone. The primary soils are 20 to 40 inches thick and have gravelly and very gravelly clay loam and sandy clay loam textures. The dominant potential natural vegetation is subalpine fir/Oregon grape, subalpine fir/common snowberry, subalpine fir/grouse whortleberry, Engelmann spruce/grouse whortleberry, and tall forbs.

The benches are located on mid elevation sites with dominant slope gradients from 0 to 40 percent. This landscape includes upland benches, old pediment surfaces, landslides, and mountain sideslopes formed in sandstone, shale, siltstone, mudstone, and fanglomerate. The primary soils are generally 60 inches thick and have silt loam and silty clay loam surface textures with gravelly and very gravelly silty clay loam subsoils. The dominant potential natural vegetation is subalpine fir/pinegrass, Douglas fir/blue huckleberry, subalpine fir/grouse whortleberry, and Engelmann spruce/grouse whortleberry.

The valleys are located on low elevation sites with dominant slope gradients from 0 to 20 percent. This landscape includes alluvial fans, terraces, floodplains, stream bottoms, and toes of landslides and debris flows that are formed in various materials. The primary soils are 60 inches thick and have various textures. The dominant potential

natural vegetation consists of riparian communities along streams and rivers. Drier potential natural vegetation types occur on terraces which include mountain big sagebrush/Idaho fescue, subalpine big sagebrush/mountain brome, and subalpine fir/heartleaf arnica.

Slope stability was assessed during the course of the Soil Survey conducted in the area from 1988 – 1993. Slope stability ratings were assigned for each Soil Survey map unit and are displayed in Map 3.4.1d. Table 3.4.2b displays the acres by stability rating within the watershed assessment. The ratings are defined as follows:

Stable	Evidence of past landslide activity has not been discerned and the observable characteristics of the land are evidence that the probability of landslides in the future is low..
Marginally Unstable	Evidence of past landslide activity has not been discerned but there are some land characteristics that suggest a landslide potential may exist.
Marginally Unstable	Evidence of past landslide activity is discernable but none of are recent origin, i.e., within the last 50 years. The assumption is that the area is gaining stability but certain disturbances at critical locations could reactivate mass movements.
Unstable	Evidence of recent mass movement or fresh tension cracks are discernable. Probabilities of additional mass movements are high.

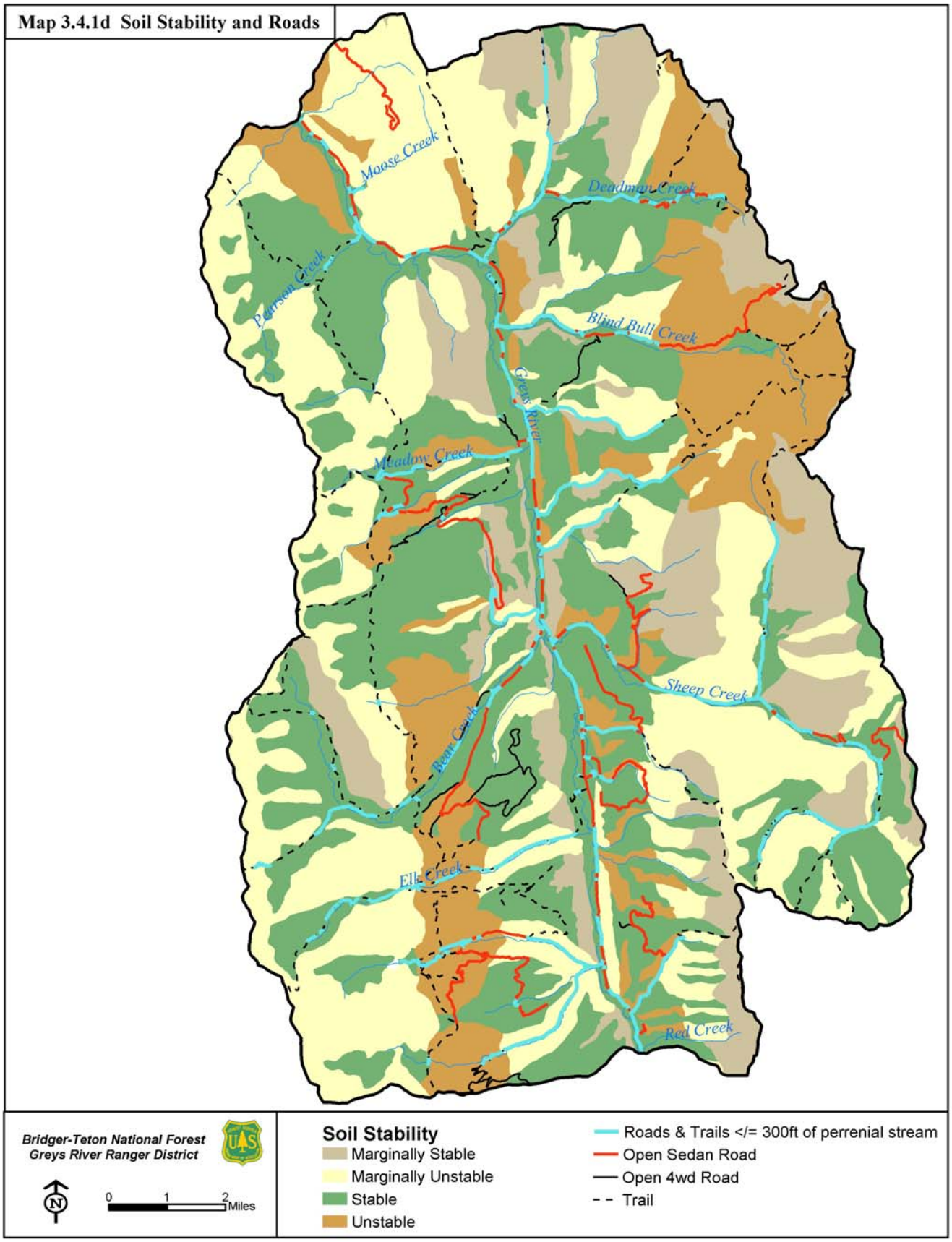

Map 3.4.1d Soil Stability and Roads
Moose Creek
Deadman Creek
Pearson Creek
Blind Bull Creek
Greys River
Meadow Creek
Sheep Creek
Bear Creek
Elk Creek
Red Creek
Bridger-Teton National Forest
Greys River Ranger District
0 1 2 Miles
Soil Stability
Marginally Stable
Marginally Unstable
Stable
Unstable
Roads & Trails </= 300ft of perrenial stream
Open Sedan Road
Open 4wd Road
Trail

Table 3.4.2b. Acres of stability type

STABILITY	ACRES
Marginally Stable	16585
Marginally Unstable	36714
Stable	38073
Unstable	17746

Desired Future Condition

The desired future condition within the assessment area is to maintain site productivity within the inherent capability of the soils found in the area. Soil conditions in many areas are within their inherent productivity capabilities; however some areas within grazing allotments have suffered from excessive soil erosion over the past years and are in need of restoration. These areas are mainly within the Blind Trail, Blind Bull and Deadman allotments.

Section

4 Recommendations

Recommendations of the interdisciplinary team are outlined below. These recommendations, which are not prioritized, include projects and monitoring programs that address resource and human-use issues identified in Section 2, and the key findings discussed in Section 3. The spread of invasive and noxious weeds (Issue and Concern #6) is a problem throughout the assessment area. No decisions have been made regarding implementation of any of the recommendations that have potential for affecting the quality of the human environment. Further analysis, conducted under the National Environmental Policy Act (NEPA), would need to occur first. Additional analysis would confirm or refute any particular recommendation, thus enabling an administrative decision on whether to proceed.

Table 4.1 Recommendations for the Middle Greys River Assessment Area by drainage or area.

Drainage/Area	Recommendations	Issue/Concern Addressed
Sheep Creek	• Maintain scenic quality along McDougal Gap Road, access to top of WY Range for recreation traffic.	6,16
	• Minor improvement needed at North Fork trail head – info sign, turn-around, weed control	6,16
	• Marking and tread work needed on North Fork Trail in order for people to find it	16
	• Explore opportunity for ATV routes using old road network in Bug Creek area	4
	• Explore opportunity for ATV trail loop between Sheep Creek (or Buck Cr knoll) and North Twin Creek	4
	• Aspen Restoration using mechanical treatment and/or prescribed burn	1,9
	• Commercial Timber Harvest to attain "properly functioning condition"	2,7,9,13
	• Sheep Creek (lower elevations) drainage lays on unstable slopes and within 300 feet of a perennial channel.	10
	• Rip-rap and boulders should be removed from under bridge which was replaced on Sheep Creek.	10
	• Culverts creating a fish migration barrier at three sites on FSR 10126	10

Bear Creek	• Recommend changing travel Plan for non-motorized management for the upper end of trail # 085. Trail needs treadwork, signing, and marking. • Opportunity for ATV loop in lower Bear Creek south to divide with Elk Creek, using old road system and existing open low-use roads. • Aspen Restoration using mechanical treatment and/or prescribed burn in Bear and Elk Creek drainages. • Commercial Timber Harvest to attain "properly functioning condition" in Bear and Elk Creek drainages. • FSR 10138 above Forest Park needs to be upgraded to meet travel needs. • Sediment delivery point at culverts on North Twin Creek @ FSR 10365, South Twin Creek @ FSR 10138, Bear Creek @ FSR 10214, Black Cyn. @ FSR 10138, Ridge Creek @ FSR 10366, Red Creek @ FSR 10138, North Three Forks @ 10043 and South Three Forks @ FSR 10006 • Update Allotment Management Plan for Three Forks Creek. • Culverts creating a fish migration barrier on North Three Forks, Middle Three Forks, North Twin Creek and three sites on Bear Creek. • Manage upper Buck Creek Trail (091) for non-motorized uses. • Possible ATV loop in Park Creek/Buck Creek area, linking old roads and existing routes. • More effective closures of logging roads in Three Forks area now closed to motor vehicles, OR consider whether some should be open to ATVs. • Maintain recently made trail improvements at Barstow Lake • Opportunity to restore scenic quality in old clearcuts in Three Forks drainage. • Elk Creek needs more effective closure where road from Bear Creek is gated.	4,5,16 4 1,7,9 2,7,9 12 10 14 10 5 4 5 16 15 5

Bear Creek	• Signing at bottom where Elk Creek trail leaves feedground. • Fuel Reduction at Forest Park Campground and WG&FD Cabin at Forest Park Elk Feeding Grounds. • Riparian area at Forest Park Feedgrounds is over-utilized by elk.	16 2,7,9 9,11
Deadman Creek	• FSR 10005 needs to be drained in places and surfaced to prevent erosion and accommodate existing use. • Surfaced trailhead parking and directional signing is needed at trailhead end of Middle Ridge Trail, Telephone Pass, and Deadman Peak Trails. • Road ends at Deadman Mine – turn-around and parking for possible new trail head (old jeep road to top of the Wyoming Range). • Travel plan changes recommended: Telephone Pass and Deadman Peak trails to be managed for non-motorized use. • Aspen Restoration using mechanical treatment and/or prescribed burn in Pearson Creek, Henderson Creek • Commercial Timber Harvest to attain "properly functioning condition" • Sediment delivery point at culverts on Moose Creek @ FSR 10138, Little Elk Creek @ FSR 10138, Deadman Creek @ 2 sites on 10005 • Update Allotment Management Plan for Deadman Creek • Reduce the number of trails that ford (FST 075) on North Fork of Deadman Creek	10,12 16 5,16 4,5 1,7,9 7,9,13 10 14 10,11

Deadman Creek	• Culverts creating a fish migration barrier at Moose Creek, and five sites on Deadman Creek • Consider options for a better trailhead at Pearson Creek. Camping and trail head parking are mixed. Create a safe ford for foot traffic. • Maintain Henderson picnic/scenic site and consider adding interpretive sign. • Effective road closures are needed along Little Elk – Porcupine Road – ATV traffic is leaving road and getting to top of Middle Ridge. • Wildland Urban Interface Fuel Reduction on FS land adjacent to Deadman Ranch. • Location for a group campsite in the vicinity of Moose Flat campground. • Expand the Moose Flat campground to the south, this will require moving the Pearson Creek Trailhead. • Fuel Reduction at Moose Flat Campground and WG&FD Administrative Site at Moose Creek.	10 16 16 5 2,7,8,9 16 16 2,7,8,9
Blind Bull Creek	• Keep FSR 10123 in good shape for access to top; improve signing and marking of Wyoming Range trail from trail head parking area at top, as well as more effective vehicle closures where needed. • Aspen Restoration using mechanical treatment and/or prescribed burn in Cabin Creek, Blind Bull Creek, Meadows Creek and Black Canyon drainages. • Commercial Timber Harvest to attain "properly functioning condition" in Deadhorse Creek and Blind Bull Creek drainages. • Sediment delivery point at culverts on Little Blind Bull @ FSR 10123, Blind Bull @ FSR 10123, Trail Creek @ FSR 10138, Lower Cabin Creek @ FSR 10256, Moffat Creek @ FSR 10138, and Cabin Creek @ FSR 10256 • Update Allotment Management Plan for Meadow Creek	5,16 1,7,9 2,7,13 10 14

Blind Bull Creek	• Culverts creating a fish migration barrier at Little Blind Bull Creek, Blind Bull Creek, 2 sites @ Lower Cabin Creek, and Cabin Creek.	10
	• Investigate opportunity to manage link between Lower Cabin Creek road and Meadow Creek for an ATV loop.	4,16
	• Trailhead to Cabin Creek Peak is indistinct and not well marked; could improve with signing and blazing.	16
	• Restore Way Trail (Upper Cabin Creek) where old logging roads have been superimposed on it; manage for non-motorized uses. Sign, mark, and restore tread.	5,16
	• Change in travel plan recommended – Meadow Creek above Way Trail junction to Covey Pass should be managed as non-motorized.	1,7,9
	• Effective closure and signing recommended to restrict motorized travel on section of Way Trail north of Meadow Creek.	5
	• Lower Meadow Creek – use of ATVs on slope adjacent to creek has created watershed concern – relocate short section of trail to provide some vegetation buffer to the creek.	5,11
	• Possible ATV loop in area, from Meadow Creek to Lower Cabin. Route would cross Deadhorse Creek.	4
	• Wildland Urban Interface Fuel Reduction on FS land west of Box Y Ranch.	2,7,8
	• As per CIP project, improve the Meadows Guard Station structure, water and septic system and continue to make available for public rental.	16
	• Fuel Reduction at Meadows Guard Station.	2,7,8

Section

5 Interdisciplinary Team Members

Name	Discipline	Office
Eric Winthers	Forest Soil Scientist	Supervisors Office
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Candi Eighme	Fire Management Officer	Greys River/Kemmerer Ranger Districts
Bart Singley	Assistant Fire Mangement Officer	Greys River Ranger District
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